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THIS BOOK MAY NOT BE PHOTOCOPIED

PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

ZOOLOGICAL SOCIETY

OF LONDON.

FOR THE YEAR

1876.

PART III.

CONTAINING PAPERS READ IN

MAY AND JUNE.

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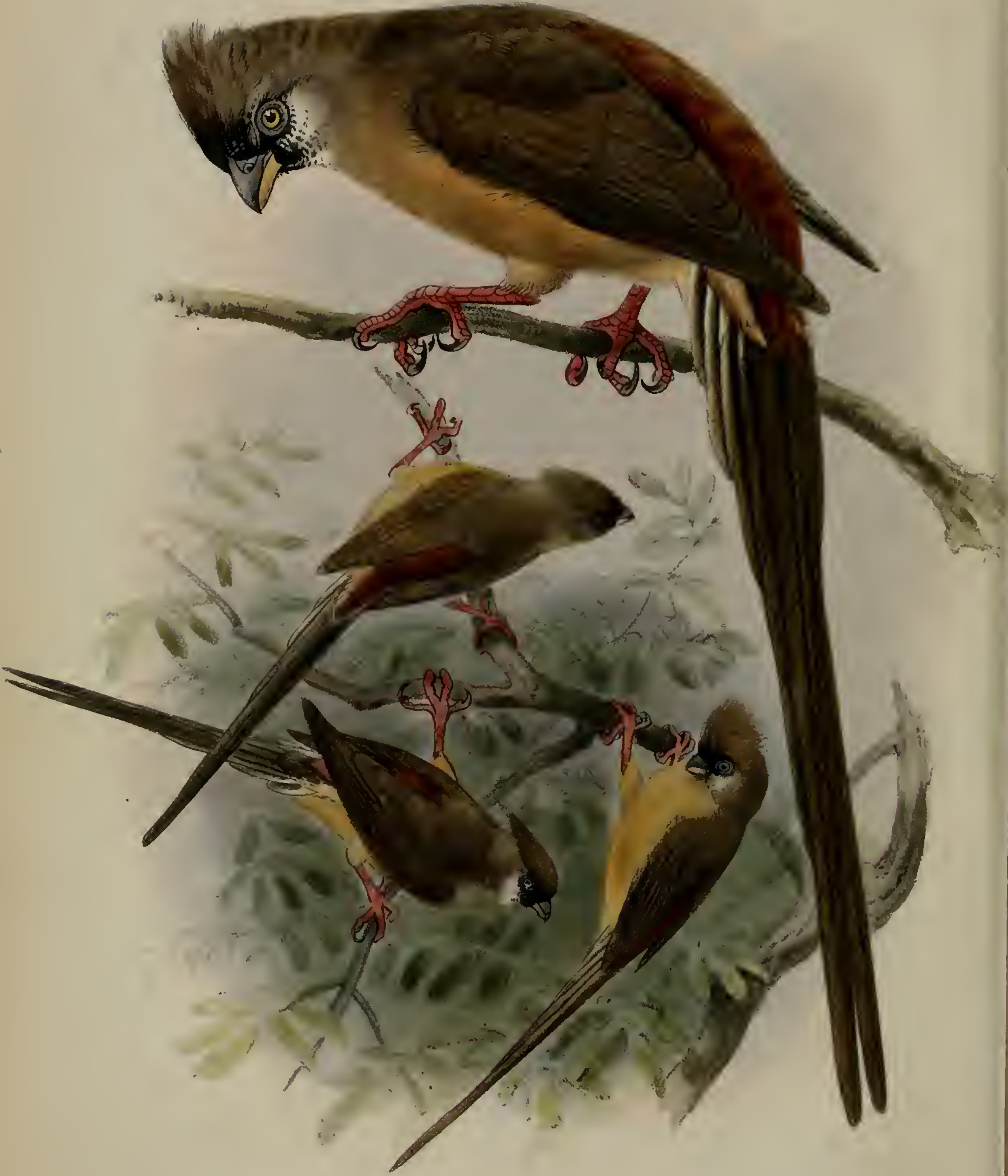

J. G Keulemans lith

M&N Hanhart imp

COLIUS CASTANONOTUS

May 2, 1876.

Robert Hudson, Esq., F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of April 1876:—

The registered additions to the Society's Menagerie during the month of April were 95 in number. Of these, 58 were acquired by presentation, 12 by purchase, 7 by birth, and 18 were received on deposit. The number of departures during the same period, by death and removals, was 90.

The most noticeable additions during the month of April were as follows:—

1. A collection of Angolan animals brought home and presented to the Society by Lieut. V. R. Cameron, the celebrated African traveller. The collection contained the following animals:—

Name.	Scientific name.	Locality.
1 Sooty Mangabey	*Cercocebus fuliginosus*	Bought in Gaboon.
2 Guinea Baboons	*Cynocephalus babouin*	From river Kwanza.
1 Drill	*Cynocephalus leucophæus*.	Bought in Gaboon.
1 Monteiro's Galago	*Galago monteiri*	From Bailunda.
1 Servaline Cat	*Felis servalina*	From river Kwanza.
1 African Civet	*Viverra civetta*	From river Kwanza.
1 Banded Ichneumon	*Herpestes fasciatus*	From river Kwanza.
1 Senegal Touracou	*Corythaix persa*	Bought on board.
1 Angola Vulture	*Gypohierax angolensis*	From river Kwanza.
3 Broad-fronted Crocodiles.	*Crocodilus frontatus*	Bought on r. Kongo.

Lieut. Cameron also brought with him—

2. Two Chestnut-backed Colies (*Colius castanonotus*) from the river Daude, north of Loanda, presented by Henry C. Tait, Esq., C.M.Z.S.

These are the first examples of this singular form that have yet reached us alive, and are most acceptable, as showing us the various ways in which the Colies use their curiously formed feet, and the manner in which they suspend themselves head downwards.

Mr. Keuleman's drawing (Plate XXXV.) portrays these interesting birds, which are likely to do well.

Colius castanonotus was originally described by Verreaux (Rev. Zool. 1855, p. 351). Verreaux gave no locality for the species; but Hartlaub (Orn. Westafr. p. 157) states that Gaboon is its *patria*.

3. Two young Cassowaries from New Britain, presented by Mr. George Brown, C.M.Z.S., as announced in his letter already read to the Society[*], and received April 26th, by the 'Paramatta.' The other birds kindly sent by Mr. Brown have not reached us alive. We have to thank our excellent friend Dr. Bennett for his care

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[*] See P. Z. S. 1876, p. 2.

of these birds at Sydney, and the officers of the ship 'Paramatta' for their passage home.

This addition augments the number of Cassowaries now living in the collection to 8 individuals, belonging to 6 species, namely:—

Number.	Latin name.	How and when obtained.
1	*C. galeatus*............	Purchased March 3, 1874.
1	*C. beccarii*	Presented by Sir J. Fergusson, Bart., F.Z.S., June 7, 1875.
2	*C. australis*	Presented by the Marquess of Normanby, January 23, 1875.
	C. australis	Presented by E. P. Ramsay, Esq., C.M.Z.S., May 28, 1875.
1	*C. uniappendiculatus*	Presented by Capt. Moresby, Aug. 25, 1874.
1	*C. picticollis*	Purchased May 27, 1874.
2	*C. bennetti*, jr.	Presented by the Rev. Geo. Brown, C.M.Z.S., April 26, 1876.

The Secretary read extracts from several letters addressed to him by Dr. George Bennett, F.Z,S., dated from Sydney in February last, referring to the proceedings of Mr. L. M. D'Albertis, C.M.Z.S., who had arrived in Sydney on the 4th of February from Yule Island, New Guinea, and was intending to stay there two months to recruit and obtain supplies, and then to return to New Guinea. Dr. Bennett enclosed a plan of the "Fly River," New Guinea, made during the cruise up it of the London Missionary Society's steamer 'Ellengowan,' in December 1875, in which M. D'Albertis, who had accompanied the expedition, had marked the different birds he had obtained or observed during the voyage. Amongst these were noted *Paradisea raggiana, Goura* sp. inc., *Buceros ruficollis, Tadorna* sp. inc., *Manucodia viridis, Epimachus magnificus,* and other rare species.

Mr. Osbert Salvin, F.R.S., exhibited and made remarks on a portion of a trunk of pine (*Pinus*) from Guatemala, perforated by a Woodpecker (*Melanerpes formicivorus*), for the purpose of storing acorns*.

Mr. G. Dawson Rowley, F.Z.S., exhibited a specimen of *Machærirhynchus nigripectus* of Schlegel, from New Guinea, being the fourth known member of this very curious genus founded by Mr. Gould. This he believed to be the first example of this species which had reached this country.

Mr. J. H. Gurney, Jun., F.Z.S., exhibited an example of the Lesser Whitefronted Goose (*Anser erythropus*), killed in Egypt, and made a few remarks on the other known Geese of that country.

Mr. A. Grote exhibited the original drawing by Col. Gordon, from which the plate of *Ovis polii* in the 'Proceedings' (1874, plate liii.) was prepared, and made the following remarks on Mr. Blanford's criticisms published in the Society's 'Proceedings' for 1875 (p. 540):—

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* *Cf.* Baird, Brewer, & Ridgway, 'North American Birds,' vol. ii. p. 569.

"Col. Gordon has asked me to lay before the meeting his original drawing of this Sheep, which has not been successfully reproduced by our artist, Mr. Smit. The male here has not the long bushy tail spoken of by Mr. Blanford; its lower outline is distinct in the sketch, though indistinct in the plate, so that the hair on the left flank may be taken to belong to the tail. This indistinctness has misled Mr. Blanford.

"Again, the black dorsal line on the female, to which Mr. Blanford objects, is far more *prononcé* in the plate than in the drawing, in which, moreover, the colouring of the figures is neither so dark nor so rufous as it has been rendered in the plate. Mr. Blanford's criticism of the coloration of the lower parts of the male and of the drawing of his horns is certainly less applicable to the original drawing than to the plate.

"As regards the apparent manes on both the male and female figures, it is admitted by Col. Gordon that in the latter this character has been exaggerated. Both Stoliczka and Severtzoff allude to short manes in their descriptions of the animal. The elongated hairs between the shoulders and behind the horns are mentioned by Stoliczka and Blanford, while Severtzoff says, 'the neck is covered by a white mane, shaded with greyish brown' (*cf.* P. Z. S. 1875, p. 513). I certainly found no trace of any thing like a mane or of a dorsal line in the specimen lately mounted in the British Museum; but this character may be variable, and as yet we have comparatively but few skins of this animal.

"It is quite true that Col. Gordon is no naturalist, and his sketch seems to have been made somewhat in a hurry; but it was made, he tells me, from the animal described by Stoliczka, who examined it while in progress, and would certainly have pointed out to the artist any flagrant inaccuracies."

Mr. George Busk, F.R.S., read a memoir on the Ancient or Quaternary Fauna of Gibraltar, as exemplified in the Mammalian remains found in the ossiferous breccia which occurs in the caves and fissures recently explored in different parts of the Rock. Mr. Busk, after a preliminary description of the geological features of the Rock and its fossiliferous caverns and fissures, treated specially of the various bones of the Bear, Cat, Horse, Rhinoceros, Stag, Ibex, and other animals, of which the remains occur there, and proceeded to refer them to the species to which they seemed to belong.

This paper will be published in full in the Society's 'Transactions.'

The following papers were read:—

1. Notes on the Anatomy of the Colies (*Colius*). By A. H. Garrod, M.A., F.Z.S., Prosector to the Society.

[Received April 25, 1876.]

About the systematic position of the Colies there has always been considerable uncertainty, partly on account of the peculiarities of their habits, and partly because their internal structure is but incompletely known. One of the examples of *Colius castanonotus*, sent to the Society by Mr. H. C. Tait, C.M.Z.S., having died just as it reached this country, I have had the opportunity of dissecting the bird, and of examining several of its special anatomical details.

Dr. Murie* has, not long since, given us an excellent *résumé* of the views entertained by different naturalists as to the systematic position of the Colies, few of which are based an any thing more than external form and habits. Burchell † placed them close to *Corythaix*; and he has been followed by many. Mr. Wallace ‡, from a study of their habits, refers them to the Parrot tribe.

In his 'Pterylography' Nitzsch § places *Colius* among his Amphibolæ, together with *Musophaga* and *Opisthocomus*, mentioning nevertheless that the genus "has a very remarkable arrangement of the feathers, and can only be compared in this respect with *Buceros*."

In his important memoir "On the Classification of Birds," Prof. Huxley ‖ places *Colius* among his Desmognathæ, in the smaller group Coccygomorphæ, the genus being the sole representative of one of its minor divisions. Prof. Huxley makes no special reference to the skull.

Dr. Murie has given us valuable information on the osteology of the bird ¶; and I am able to confirm most of his observations. There is, however, one part of the skeleton (the palate) where my results differ considerably from those of my predecessor; and these it is necessary for me to record. Dr. Murie tells us that the specimen at his disposal was somewhat injured; nevertheless, of the maxillo-palatine processes of the maxillary bones, he says that they intrude but a slight way beyond the palatal rods, and leave a wide middle space betwixt them, and that, "as respects the presence of a vomer, there is apparently a short one, tapering rather than abruptly truncate anteriorly, and not visibly cleft behind." Dr. Murie therefore removes *Colius* from among Prof. Huxley's Desmognathæ, and consequently from the Coccygomorphæ.

In the preparation of the skull of my specimen of *Colius castano-*

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* Ibis, 1872, p. 262.

† Travels in South Africa, vol. i. p. 214 (footnote).

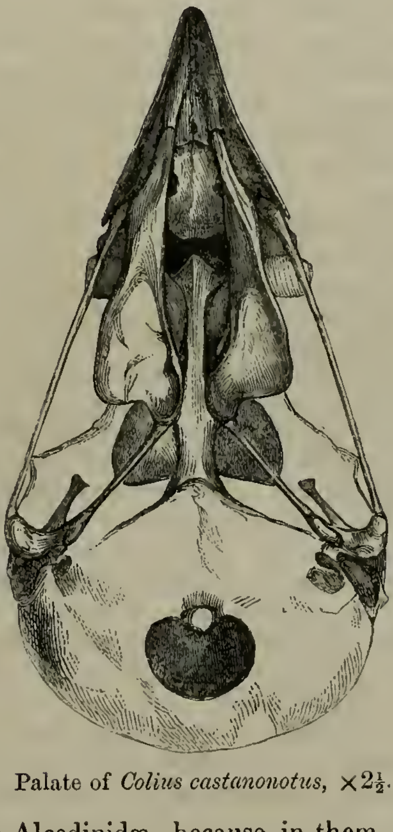
‡ Annals & Mag. of Nat. Hist. 1856, p. 213.

§ Ray Society's English Translation, edited by Mr. Sclater, p. 107.

‖ P. Z. S. 1867, p. 466.

¶ *Loc. cit.* p. 266, pl. x.

notus I have taken special care; and I find that the bird, as will be seen by the drawing which I exhibit, is without doubt desmognathous. Moreover, as the desmognathism apparently depends on the fusion of the feebly developed maxillo-palatine plates across the middle line as well as with the ossified nasal septum, it should, according to the valuable nomenclature of Prof. Parker [*], be termed *direct* (of the first variety), as in the Falcons. It is not, however, possible to determine with certainty from the adult skull (from mine at least) whether the nasal septum has intervened between the maxillo-palatines, as in the Eagles, Vultures, and Owls, and as it is in the Alcedinidæ, because in them there is a demonstrable interval between the free posterior ends of these plates, the intermediate septal bond but incompletely uniting them. A slightly more extensive ossification in this region would reproduce a Parrot's palate in that of the Coly.



Palate of *Colius castanonotus*, ×2½.

Next, with reference to the vomer, the result of carefully watching the skull during maceration, and of a minute inspection of the palate in the prepared specimen, convinces me that that bone is not ossified. In thus lacking the vomer, *Colius* and *Alcedo* agree.

The sternum of my specimen closely resembles that figured by

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[*] Trans. Zool. Soc. vol. ix. p. 293.

Dr. Murie; the crenulation, however, of the lateral margins of the keel-bearing middle xiphoid process is not apparent. The bone resembles that of the Capitonidæ more than the sternum of any other bird (see, for comparison, Eyton's 'Osteologia Avium,' plate 8).

In the structure of its soft parts *Colius* presents several interesting features which assist in the determination of its affinities.

The skin is particularly tough, much like that of the Swifts in this respect. Only one carotid artery is present, the left. In the Musophagidæ, Cuculidæ, Coraciidæ, Galbulidæ, and Alcedinidæ we know that both a right and a left artery are always developed *; whilst in the Bucerotidæ *Toccus* possesses only the left, *Buceros* having both,—the left only being found, as in *Colius*, in the Picidæ (*i. e.* Picinæ, Ramphastinæ, and Capitoninæ), Upupidæ, Meropidæ, Trogonidæ, and Passeres. As far, therefore, as the carotid arteries are concerned, the Colies do not resemble the Musophagidæ, their supposed nearest allies. The comparison with Parrots must be reserved till further on.

Myologically, *Colius* wants the *ambiens* muscle. It is therefore Anomalogonatous †, and agrees with the passeriform and piciform birds only, differing essentially from the Musophagidæ. The *femoro-caudal* is well developed, but has no accessory head. The *semitendinosus* and its accessory head are both fairly developed. The myological formula of the bird on the system adopted by me in my paper on Classification, just referred to, is A,XY, the same as that of most passeriformes and piciformes, but differing importantly from that of the Musophagidæ (AB,XY) in the absence of B, the *accessory femoro-caudal* muscle. The *tensor fasciæ* of the thigh does not in the least cover the biceps muscle.

In the arrangement of its plantar tendons *Colius*, although so peculiar and uncertain in the manner in which it employs its toes, exactly resembles the feeble-footed Alcedinidæ, and hardly differs from the Coraciidæ, Meropidæ, Bucerotidæ, and Caprimulgidæ. In *Musophaga* the distribution of the tendons is on quite another principle, as it is in the Psittaci‡.

The intestines of *Colius* are voluminous and short, being only 9 inches in length. I could find no trace of intestinal cæca. Nitzsch has shown that the oil-gland is tufted, and that there are ten rectrices.

In my paper on the classification of birds I proposed to distribute the Anomalogonatæ into two groups, according to whether the cæca are present and at the same time the oil-gland is nude, or the cæca are absent and the oil-gland is tufted, arranging them in the following manner:—

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* P. Z. S. 1873, p. 464.

† P. Z. S. 1874, p. 116.

‡ *Vide* P. Z. S. 1875, p. 339.

PICIFORMES.	PASSERIFORMES.
With tufted oil-gland and without cæca.	With nude oil-gland and with cæca.
Pici.	*Passeres.*
Capitoninæ.	*Bucconidæ* (? as to cæca).
Ramphastinæ.	*Trogonidæ.*
Upupidæ.	*Meropidæ.*
(*Coliidæ*).	*Galbulidæ.*
Bucerotidæ.	*Caprimulgidæ.*
Alcedinidæ.	*Coraciidæ.*
	Momotidæ.

From what has been said above it is evident that *Colius* must be included among the Piciformes, and near those of this division with a left carotid only, a four-notched sternum, and a blended plantar-tendon arrangement. No other piciform bird, however, combines all these characters. In the Alcedinidæ the sternum and plantar arrangement correspond; in the Bucerotidæ *Toccus* agrees as to the carotid and the plantar tendons. The Picidæ (Picinæ + Capitoninæ + Ramphastinæ) have a left carotid, a two-notched sternum, but a specialized plantar-tendon distribution. Consequently the fact that the combination of characters is unique justifies us in retaining the Coliidæ in a separate family, related on the one hand to the Picidæ, and on the other to the Alcedinidæ and Bucerotidæ.

Something must be said with reference to the probability of *Colius* having psittacine affinities. It is an interesting fact that in those species of the genus *Cacatua* (*galerita, leadbeateri, moluccensis*, &c.) in which the oil-gland is not lost, the resemblances (only accidental I assume) to the genus *Colius* are peculiarly numerous. In these *Cacatuæ* there is a left carotid artery only, no ambiens muscle, and a myological formula A,XY. Nevertheless I hope that in my paper on the Order Psittaci * the impression left by its perusal is that the Parrots all sprang straight away from a stock with two carotids and an ambiens muscle. Such being the case, and *Colius* most certainly not being a true Parrot, the arguments in favour of its having arisen independently from the psittacine ancestor, and of its having undergone (also independently) cacatuiform modifications during the progress of its evolution, are less easy to accept than those which suppose it to have sprung, as I have above assumed, from the less specialized stock whence has been derived all the Anomalogonatæ. The form of the sternum and the distribution of the plantar tendons are in favour of this view of the question.

It may be mentioned that the syrinx of *Colius* (which has been figured by Johannes Müller† in a closely allied species) is most nearly related to that of *Ceryle* among the Kingfishers.

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* P. Z. S. 1874, p. 586.

† Ueber die bisher unbekannten typischen Verschiedenheiten der Stimmenorgane der Passerinen, 1847, pl. v. figs. 9–12.

2. Description of a new Thrush from Taviuni, one of the Fiji Islands. By E. L. LAYARD, C.M.G., F.Z.S., H.B.M. Consul for Fiji and Tonga.

[Received May 2, 1876.]

I am indebted to Mr. Tempest for examples of a third species of Fijian Thrush (*Turdus*), which I propose to designate by his name, having given the appellation of *vitiensis* to the species previously discovered by him at Bua.

The present bird is most interesting, as being intermediate between *T. vitiensis* and *T. vanicorensis* in colour, and likewise as being particoloured, as is the case in the first species discovered in these islands, *Turdus bicolor* (Ibis, 1875, p. 153).

It may be described as follows:—

TURDUS TEMPESTI, sp. nov.

♂. Dark smoky-brown (almost as black as in *T. vanicorensis*) throughout, with the exception of the entire head and chest, which are drab-coloured, tinged with red, much like the colour of *T. vitiensis*, nobis. Bill and feet bright orange.

Length 8″, wing 4″ 2‴, tail 3″ 2‴, tarse 1″ 4‴, bill 1″ 2‴.

The ♀ is paler and ruddier, and the head and chest less distinctly marked. A young ♂ nestling shows the dark plumage of its father, with reddish-brown shafts to many of the feathers of the back, and the same colour on the edges and tips of the feathers of the head and wing-secondaries. Underparts confusedly marked with the same.

Mr. Tempest tells me that this species has the same metallic chattering note as the European bird, but that he never heard it "sing." It inhabits the forest at the south end of Taviuni, at Selia Levu, Vuna Point, scratching under the bushes for worms and insects, on which it feeds. Some specimens killed by him had the bill covered with mud, showing that they dibbled into the ground in search of worms.

3. Note on the Discovery of the Roebuck (*Cervus capreolus*) in Palestine. By the Rev. Canon TRISTRAM.

[Received May 2, 1876.]

In a paper read before the Society in February 1866*, I mentioned, in giving a list of the mammals of Palestine, that I had reason to believe the Roebuck was found in that country, though I could not produce a specimen. I felt satisfied that I could hardly be mistaken in the small Deer I had more than once disturbed on the southern shores of Lebanon; and Mr. Boyd Dawkins had identified teeth of the Roebuck among the remains of other still existing mammals in the bone-breccia of the Lebanon caves, viz. the Ibex, Elk, Red Deer, and Bison. All doubts on this subject are now solved by the fact of Dr. Conder, R.E., having obtained on Mount Carmel a specimen, which has been sent to Cambridge, and pronounced by Prof. Newton to be the true *Cervus capreolus*.

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* See P. Z. S. 1866, p. 86.

Dr. Conder states that this Deer inhabits the thickets on the sides of Carmel, and is also met with further south, in the wooded country round Sheikh Iskander, where it gives its name to one of the principal valleys, Wady Yahmûr. Special interest attaches to the discovery from the fact of its being known to the Arabs as Yahmûr, identical with the Hebrew (יָחְפּוּךְ), translated "fallow deer" in our version, and never before identified with any ruminant known to exist in Palestine.

Palestine is by far the most south-easterly region where the Roebuck has yet been found either living or among recent remains. Pallas gives *Cervus pygargus* as the Roebuck of Northern Asia, which, though identified with our Roebuck by Giebel, is generally considered to be distinct.

May 16, 1876.

Dr. A. Günther, F.R.S., V.P., in the Chair.

Mr. Sclater exhibited a skin of a rare Pacific Parrot, *Coriphilus kuhli* *, which had been sent to him for examination by Dr. Elliott Coues, C.M.Z.S. This specimen had been obtained by Dr. T. Hale Streets, U.S. Navy, at Washington Island of the Palmyra group, as indicated in the following remarks:—

"Washington, or New York, Island, the habitat of this Parrot, is situated in latitude 4° 41′ 10½″ north, and longitude 160° 18′ 0·5″ west. It was discovered in 1798 by Captain Edmund Fanning, an American; but he did not land upon it. The United-States Exploring Expedition under the command of Captain Wilkes passed it by in 1840, and reported no anchorage. The island is an obliterated atoll, and is densely covered with vegetation, the cocoa-nut palm predominating.

"It is evident from the following untechnical description taken from 'Fanning's Voyages,' that this bird existed on Fanning Island when it was first discovered. 'Amongst the birds was one species about the size of our Robin (*Turdus migratorius*), with a breast of scarlet-coloured feathers, the under portion of the body being finished off with bright red, the neck of a golden colour, back a lively green with a yellow beak, except the very points, which were of a light dun colour, the wings and tail being both of a jet-black, and the last tipped off with white; it was a most beautiful and lovely bird, with its brilliant and richly variegated plumage. We were much chagrined, while observing these, to see a Man-of-war Hawk flying by with one in his mouth, apparently having just caught it.'

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* *Domicella kuhli*, Finsch, Papag. ii. p. 749.

"Washington and Fanning are the only islands of the group (containing besides the islands Christmas and Palmyra) in which the bird is found. Washington and Fanning are situated closely together, distant from one another 77 nautical miles in a north-westerly and south-easterly direction, and they are remote from the other islands of the group.

"To quote again from 'Fanning's Voyages:' 'As at Fanning's, so here [Washington] we could perceive no token of its being at all inhabited.'

"They are still uninhabited; but the natives of the groups south of the equator visit them occasionally to gather the cocoa-nuts and to express the oil that is in them. We found such a party at Washington Island at the time of our visit. We engaged some of the Kanakas to catch the Lories alive for us. They used two pieces of bamboo, each about a yard in length. On one was perched a tame bird; and from the end of the other was suspended a running noose made of the bark of the cocoa-nut tree. The tame bird as it was carried along uttered a harsh, rasping sound; and others came out of the trees and perched alongside it on the bamboo stick, and the man noosed them by means of the other bamboo."

Mr. Sclater remarked that it was of great interest to ascertain *positively* the correct habitat of this Lory. Dr. Finsch, relying upon Bourjot's assertions, had indicated Fanning Island as its most probable *patria*, but was not without much doubt on the subject.

Dr. Günther read an extract from a letter received from Commander W. E. Cookson, R.N., of H.M.S. 'Peterel,' dated Coquimbo, March 9, 1876. Commander Cookson stated that two of the large Land-Tortoises procured from the Galapagos Islands in June 1875 were then on board, and that he was in hopes that he should be able to land them alive in England, where he expected to arrive in the beginning of next June.

The two tortoises were male and female, and, although not of a very large size, were the largest he was able to procure, and were undoubtedly adults: the male weighed 270 lbs., and the female 117 lbs. Besides these, he had the shell, head, and feet of five others from Albemarle and Abingdon Islands.

Commander Cookson had also collected and preserved specimens of *Amblyrhynchus cristatus* from the different islands of the group which he had visited, and had preserved some of the several kinds of fishes which were caught during their stay. Commander Cookson anticipated being ninety days at sea on his homeward voyage, and was afraid there would be some difficulty in keeping the Tortoises alive, as they were great eaters; he had, however, laid in a large supply of cactus, of which they were very fond. They would also eat soaked biscuit.

Dr. Peter Comrie, Staff-Surgeon R.N., exhibited the zoological specimens which he had collected during the survey of the S.E.

coast of New Guinea by H.M.S. 'Basilisk,' and read the following remarks:—

"In introducing the specimens now exhibited, my object is to show that something, although small, was done in the way of advancing natural history during the running survey made by H.M.S. 'Basilisk' of the S.E. coast of New Guinea. The opportunities were limited, and the time was short, the vessel arriving on that coast on the 20th of February, 1874, and finally leaving on May 23rd, the portion of coast embraced being from S.E. Cape to Cape Rigny, the E. point of Astrolabe Gulf. A considerable portion of time was spent among the group of islands off East Cape; but with the exception of the large D'Entrecasteaux group, where many fine butterflies were obtained, I did not find these islands at all good collecting-ground, and it was more to the northward, in Huon Gulf, on the mainland, that the richest spoils were captured. This was especially the case with Snakes and Insects, and was partly owing to the woodcutting carried on here to supply fuel for steaming-purposes on our passage to Amboyna. When any specimen considered curious was met with by the men engaged woodcutting, it was invariably saved for the 'Doctor;' and in this way I am almost entirely indebted to the men and, in some cases, the officers of the ship for what I now show. The mammals, all marsupials, were obtained alongside from the natives, who generally brought them alive, and traded them for pieces of iron hoops, which constitute the current coin all along the coast. With the exception of a Pig and a dun-coloured Dog, no mammals other than marsupials were observed. Some of the specimens are not in the best state of preservation, owing partly to my having had to leave the cases at Singapore, there having been no room for them in the hold of H.M.S. 'Basilisk,' and also to the plague of ants brought on board with the wood, and which, unless the specimens were kept enveloped in an atmosphere of carbolic acid, very soon made short work of them.

"I have no intention on this occasion to do more than generally allude to the collection as a whole, as many of the species are new, and others, although known, have hitherto not been found in New Guinea: the details connected with geographical range, diagnosis of new species, and their description, a work of time, I must leave to abler hands. I will only give a general *résumé* of the more important novelties as kindly furnished me by Mr. Sclater and Dr. Günther:—

"The *Mammals* are 9 in number; the most notable of which are 2 *Petauri* (Flying Squirrels), which differ from their nearest congener, *Petaurus ariel*, in being of a decidedly rufous tint; but whether specifically distinct can only be ascertained when their skulls have been extracted. The *Perameles* has lately been described by Dr. Peters as collected by D'Albertis in New Guinea. Two of the Bats have hitherto not been found in New Guinea.

"The *Birds*, 13 in number, belong to 11 species, the most important addition being *Manucodia* (Bird of Paradise), a new species, and which Mr. Sclater has consented kindly to name after myself; this example was the only one either seen or procured. A rather rare Tern, found by Dr. McGillivray in Torres Straits, completes what is noteworthy as regards the birds; and as Mr. Sclater has a paper on the subject of my birds, it will be better left to him.

"The *Snakes* are 7 in number; among which is a new species, a large specimen of Jukes's Sea-snake, hitherto not found nearer New Guinea than Torres Straits, and a species of *Tropidonotus*, hitherto not found in New Guinea.

"The Death-adder I was about stepping on, so thoroughly was its colour approximated to the surrounding vegetation; and an officer who accompanied me shot it as it was raising its head to strike me.

"*Butterflies.* These I am unable to exhibit, as they are not yet set up; but it is expected that a considerable number of new species may result on examination.

"*Land-shells.* These, few in number, Messrs. Adams and Angas will determine; and I have only brought down this evening a unique *Helix* discovered by McGillivray, which I found on the leaves of a species of *Pandanus* in Huon Gulf."

Prof. P. M. Duncan, F.R.S., read the second part of his memoir on the Madreporaria dredged up during the expedition of H.M.S. 'Porcupine' in 1869–70. Dr. Duncan stated that the first part of this communication had been already published in the Society's Transactions (vol. viii. p. 303), and that the present portion related to several species which were not therein mentioned. They were all simple forms, and lived in the deep sea or in shallow water. The most important species were from the Mediterranean and Atlantic off the Spanish coast. The genera *Caryophyllia, Paracyathus, Flabellum,* and *Desmophyllum* were the best-represented.

The examination of this series of corals did not necessitate any modifications of the views expressed in the former paper regarding the peculiar form of the non-reef-building Madreporaria and the affinities of many recent species with fossils.

This paper will be published in full in the 'Transactions.'

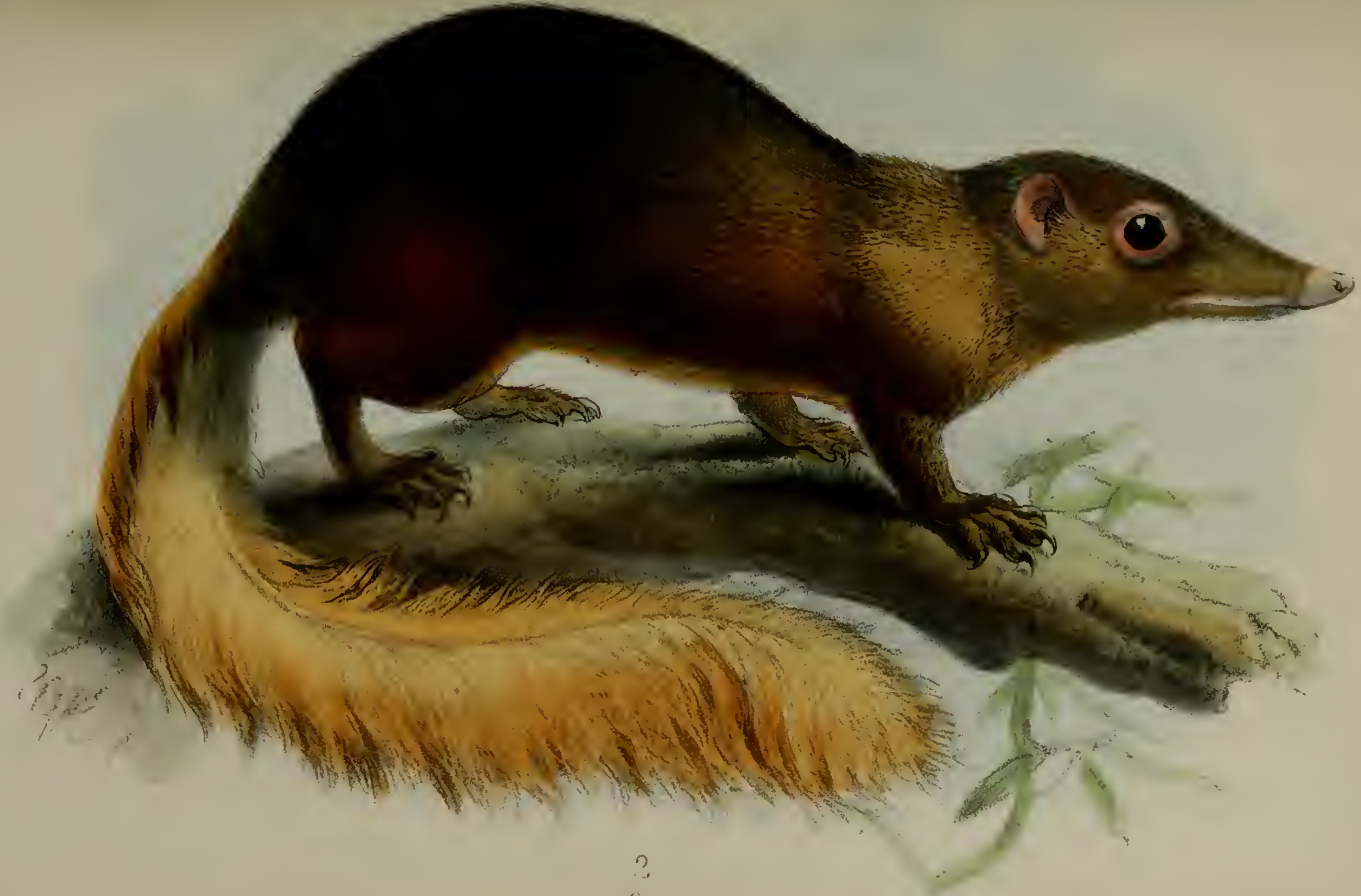
The following papers were read:—

1. Remarks on some Indian and, more especially, Bornean Mammals. By Dr. A. Günther, V.P.Z.S., Keeper of the Zoological Department, British Museum.

[Received May 16, 1876.]

(Plates XXXVI., XXXVII.)

A collection of Mammals sent by Mr. Low to the British Museum from the mainland of Borneo, opposite to Labuan, contains several specimens affording additional information as regards the fauna of that island and the distribution of the species inhabiting it. As their examination necessarily involved a comparison with specimens and species from other localities, I have added those of my notes on



J G Keulemans lith

M & N Hanhart imp

TUPAIA TANA, *var* CHRYSURA

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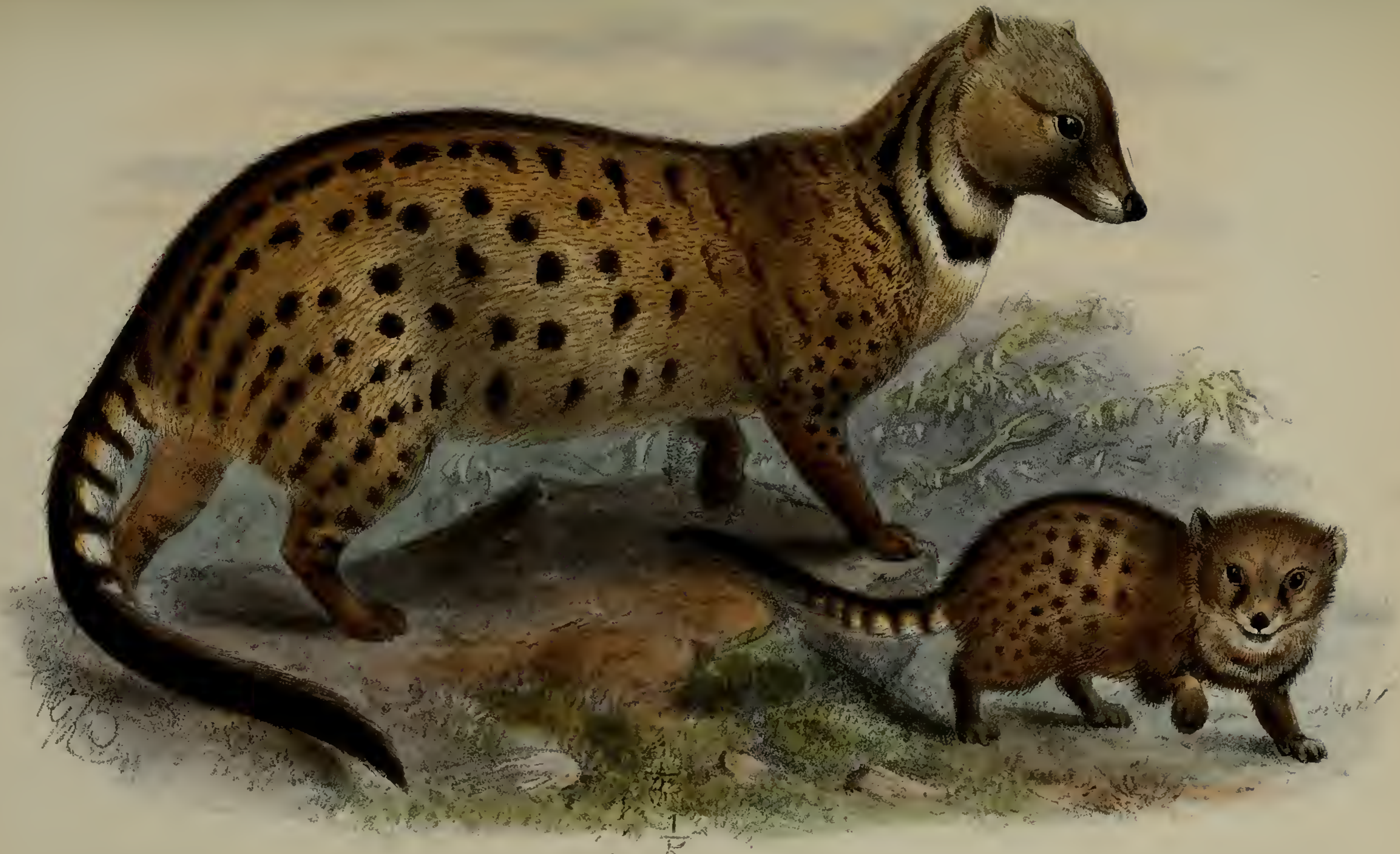

J.G.Keulemans lith.

M & N Hanhart imp.

VIVERRA MEGASPILA, *ad. et jr*

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the latter which appeared to me to contribute to a better knowledge of them.

MACACUS MELANOTUS.

This Ape proves to be a native of Borneo. It was first described under the name of *Papio melanotus*, by Ogilby, in our 'Proceedings' for 1839, p. 31. The typical specimen, which is half-grown and in the British Museum, was said to have been brought from Madras; but for some time past this has been considered very doubtful, as no other specimen has been found in any part of continental India. A second example, without known history, an adult male, was purchased of the Zoological Society in 1866 *. The third specimen, now received from North-western Borneo (mainland opposite Labuan), is quite young, only 12 inches long. The sides, abdomen, and legs are of a light chestnut-colour; the tips of many hairs shining golden. In older examples this chestnut-colour is limited to a portion of the hairs only, and more and more replaced by blackish brown. The middle of the head and back and upperside of the tail are black mixed with brown. The longitudinal median crest of long hairs on the head, characteristic of the species, is well indicated. Of particular interest is the tail, which in our specimen is perfect, and which in both the other examples (menagerie specimens) is mutilated. It is 3½ inches long, covered with short hairs, and extremely slender in the last two thirds of its length; so that the loss of this portion in specimens kept in captivity can easily be accounted for.

GYMNURA RAFFLESII, var. CANDIDA.

All the specimens received from Labuan, the mainland opposite to Labuan, and Sarawak differ from the typical form in being of a white colour, only a part of the longest and strongest hairs on the trunk being black. The head, legs, and tail are pure white. As no structural differences can be discovered either in the skull, or dentition, or any other part of the body, I consider it sufficient to distinguish this form as a merely local variety.

TUPAIA.

Having received two species of this genus from Borneo, I have examined the series of specimens in the British Museum, which is tolerably complete, at least as regards species. They may be divided thus:—

I. *Species with grizzled hair on the hind part of the back and tail.*

A. *Large species.*

1. TUPAIA FERRUGINEA (Raffl.).

The specimens in the British Museum are from Malacca, Pinang, Singapore, and Sumatra; according to Schlegel this species occurs also in Java and on the west coast of Borneo (Pontianak). The skull is distinguished by a large oval vacuity in the zygomatic arch.

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* "*Macacus speciosus*," spec. *a*, of the 'Revised List of Vertebrated Animals in the Gardens of the Zool. Soc.' p. 16. *Cf.* Sclater, P. Z. S. 1875, p. 418.

2. TUPAIA ELLIOTI (Waterh.).

This species has always remarkably short and rigid hair *; and the vacuity in the zygomatic arch is reduced to a small foramen. I have seen three examples of this species, viz.:—the type, from the hills west of Madras; a second, found by Capt. R. C. Beavan near Maunbhoom (Bengal Pres.); and the third, brought by Major Lloyd from the Matheran hills near Bombay, which is the westernmost limit of the genus hitherto ascertained.

3. TUPAIA BELANGERI (Wagn.).

Distinguished from the preceding by its much longer and softer fur. The foramen in the zygomatic arch is small, yet larger than in *T. ellioti*. Hitherto found in Burma, Upper Pegu, and Sikkim. The name given by Wagner is the first technical designation of this species, which in Bélanger's 'Voyage' is described and figured as "Tupaia du Pégou." Jerdon ('Mamm. of India,' p. 65) used the name *Tupaia peguana*, Lesson; however, the author of the account of the Mammalia in Bélanger's 'Voyage' was not Lesson, but Is. Geoffroy St.-Hilaire.

B. *Small species.*

4. TUPAIA JAVANICA (Horsf.)

Found in Java and in the Dutch possessions of Sumatra and Borneo. Distinct as this species is from *T. ferruginea*, young examples of the latter can hardly be externally distinguished from *T. javanica*; and one of the specimens examined and named *T. javanica* by Horsfield is clearly the young of the larger species, as is proved by its undeveloped dentition. A fully adult example from Java, also named by Horsfield, is 13 inches long, the tail taking very nearly one half. For comparison's sake with the following species, I give the measurements of the four posterior molar teeth of this example:

	Length. millim.	Width. millim.
a. Molar	2·0	2·0
b. Molar	3·0	3·0
c. Molar	2·5	3·5
d. Molar	1·5	3·0

5. TUPAIA MINOR, sp. n.

Closely allied to *T. javanica*, but conspicuously smaller and with much shorter and rather rigid hair. All the hairs of the upper parts are grizzled with grey, brownish grey, and black, a reddish brown tinge prevailing in the middle of the hinder half of the back and on the tail; extremity of the tail black. Shoulder-stripe distinct. Lower parts yellowish white, of the tail brownish yellow. With the exception of the terminal hairs, the hairs of the tail are rather short. Length of body 5 inches 4 lines, of tail 6 inches 2 lines.

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* To judge from one example, the fur is soft and much longer at a very young age.

The foramen in the zygomatic arch is a narrow elongate slit. The measurements of the four posterior molar teeth are as follows:—

	Length. millim.	Width. millim.
a. Molar	1·7	1·7
b. Molar	2·5	2·5
c. Molar	2·3	2·5
d. Molar	1·4	2·0

Several specimens of this species have been sent by Mr. Low from the mainland of Borneo, opposite Labuan.

6. Tupaia murina (Müll. & Schleg.) = *T. frenata*, Gray, Ann. & Mag. Nat. Hist. 1860, vi. p. 217.

II. *The greater part of the hairs on the hind part of the back and tail are of a uniform black, brown, or red colour.*

A. *Large species.*

7. Tupaia tana (Raffl.).

This species is subject to considerable variation of colour, unaccompanied by any structural modification of the skull or dentition. The second molar has sometimes a well-developed inner tubercle at the base of the cusp; but in other specimens showing exactly the same coloration this tubercle is absent. I therefore must confirm Schlegel's opinion that *Tupaia speciosa* of Wagner is not specifically distinct from *T. tana*. The following varieties may be distinguished:—

a. Var. tana. Tail black above, basal half of each hair rusty-brown, lower part of the tail dark brown. Sumatra; ? Borneo.

b. Var. speciosa. Tail brownish red above, bright rusty-red below. Sarawak, Pontianak.

c. Var. chrysura (Plate XXXVI.). Tail golden yellow, with a reddish tinge. Mainland of Borneo, opposite to Labuan.

8. Tupaia nicobarica, Zelebor, Novara-Reise, Säugeth. p. 17, Taf. 1 & 2.

Nicobars (a desideratum in the British-Museum collection).

B. *Small species.*

9. Tupaia splendidula (Gray).

Having extracted the skull from the typical specimen, I have convinced myself that this specimen is perfectly adult.

Paradoxurus philippensis (Temm.).

An adult example sent by Mr. Low from the mainland of Borneo, opposite Labuan, agrees in every respect with specimens collected by Dr. A. B. Meyer in Luzon.

Viverra tangalunga.

The Civet Cat inhabiting Borneo is the *Viverra tangalunga* of Gray.

Quite distinct from this species is the *Viverra megaspila* (Blyth, Journ. As. Soc. Bengal, xxxi. 1863, p. 331) from Pegu and the Malayan peninsula. It grows to nearly twice the size of *V. tangalunga*, with which it agrees only in having the black median dorsal streak continued along the tail, and not interrupted by the light rings, which are incomplete and few in number. In an adult female from Pinang (Cantor's *V. tangalunga*) the body measures three feet from the tip of the nose to the root of the tail, the tail 17 inches. The black spots on the body are large, very distinct, not ocellated, and arranged in five longitudinal series. This peculiar coloration is already sufficiently distinct in a very young individual, whose total length is only 19½ inches.

As this species has never been figured, or acknowledged by naturalists, I have thought it better to draw their attention to it by the accompanying figure (Plate XXXVII.) drawn from our specimens from Pinang.

2. Notices of some Deep-sea and Littoral Corals from the Atlantic Ocean, Caribbean, Indian, New-Zealand, Persian Gulf, and Japanese &c. Seas. By Prof. P. Martin Duncan, F.R.S., Pres. Geol. Soc.

[Received May 16, 1876.]

(Plates XXXVIII.–XLI.).

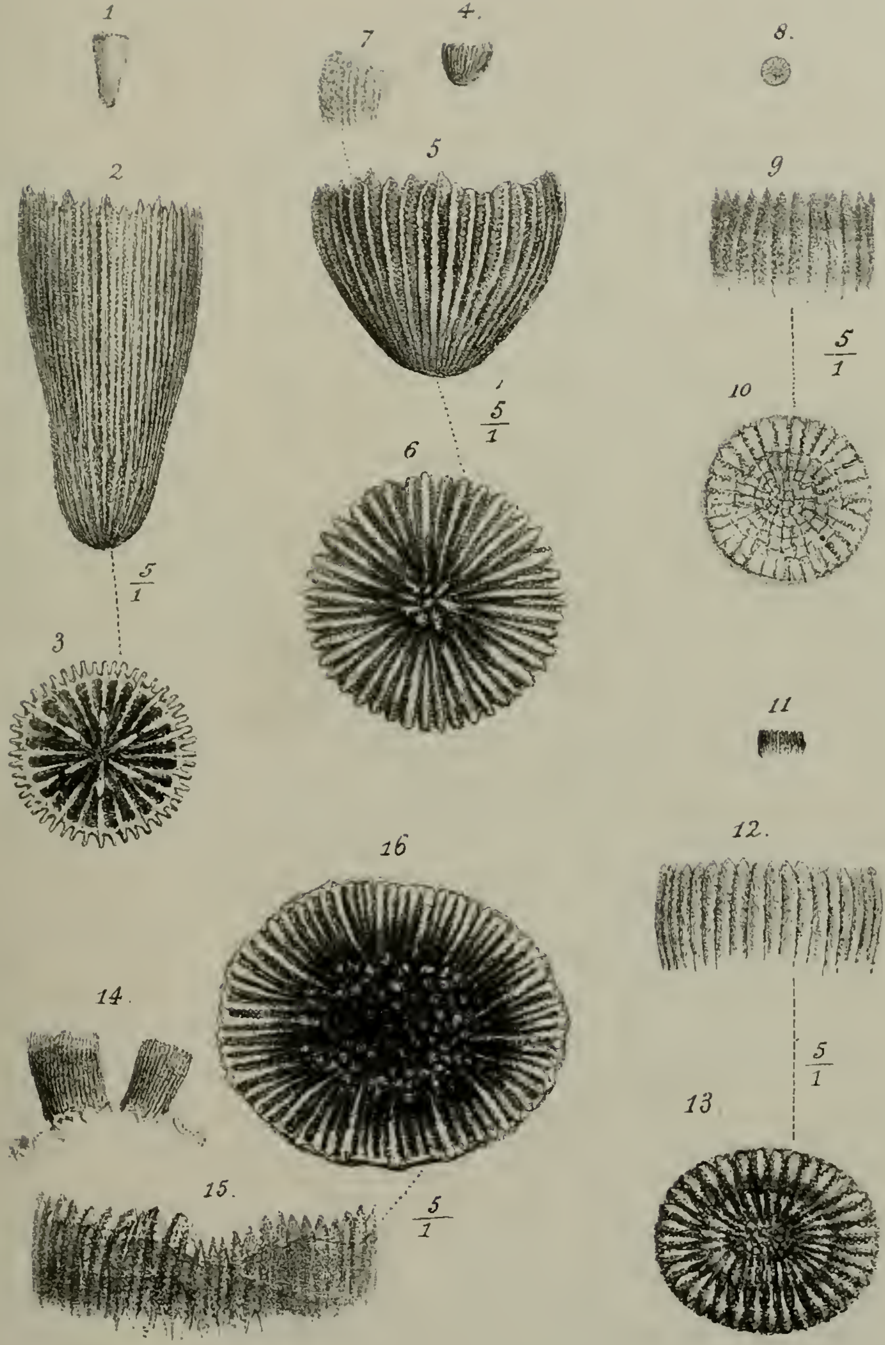
The corals which are described in this communication are nearly all remarkable forms. They are not the usual reef-building species, nor are they found in very deep seas; but, coming from remote districts, they present a most varied generic assemblage.

It has been necessary to establish several new genera in order to classify the species, and also to introduce into the recent coral fauna two genera, one hitherto considered to be represented only in the Cretaceous, and the other in the Miocene formation; but lately the last has been found in the Caribbean by Agassiz and Pourtalès.

Three of the species closely resemble fossil forms; and they are *Conocyathus zealandiæ*, *Deltocyathus orientalis*, and *Antillia lonsdaleia*, variety.

The first of these belongs to a genus which is a most marked one, and very well differentiated. It is allied to *Conocyathus sulcatus*, D'Orb., from the Miocene or Oligocene of Mayence. *Deltocyathus orientalis* is closely allied to *Deltocyathus italicus* (of the Italian Miocene); and *Antillia lonsdaleia*, var., differs very slightly from the form from the San-Domingan Miocene, described by me in the 'Quarterly Journal of the Geological Society,' vol. xx., in an essay on the fossil corals of the West Indies. This is of course a most important species; for its being found large and well developed in the Japanese seas implies that the Caribbean was once open to the west. The other evidence of this former connexion between the

P. Z. S. 1876 Pl. XXXVIII



From nat. on stone by J. Erxleben

M.& N. Hanhart imp.

NEW CORALS.

BRITISH MUSEUM
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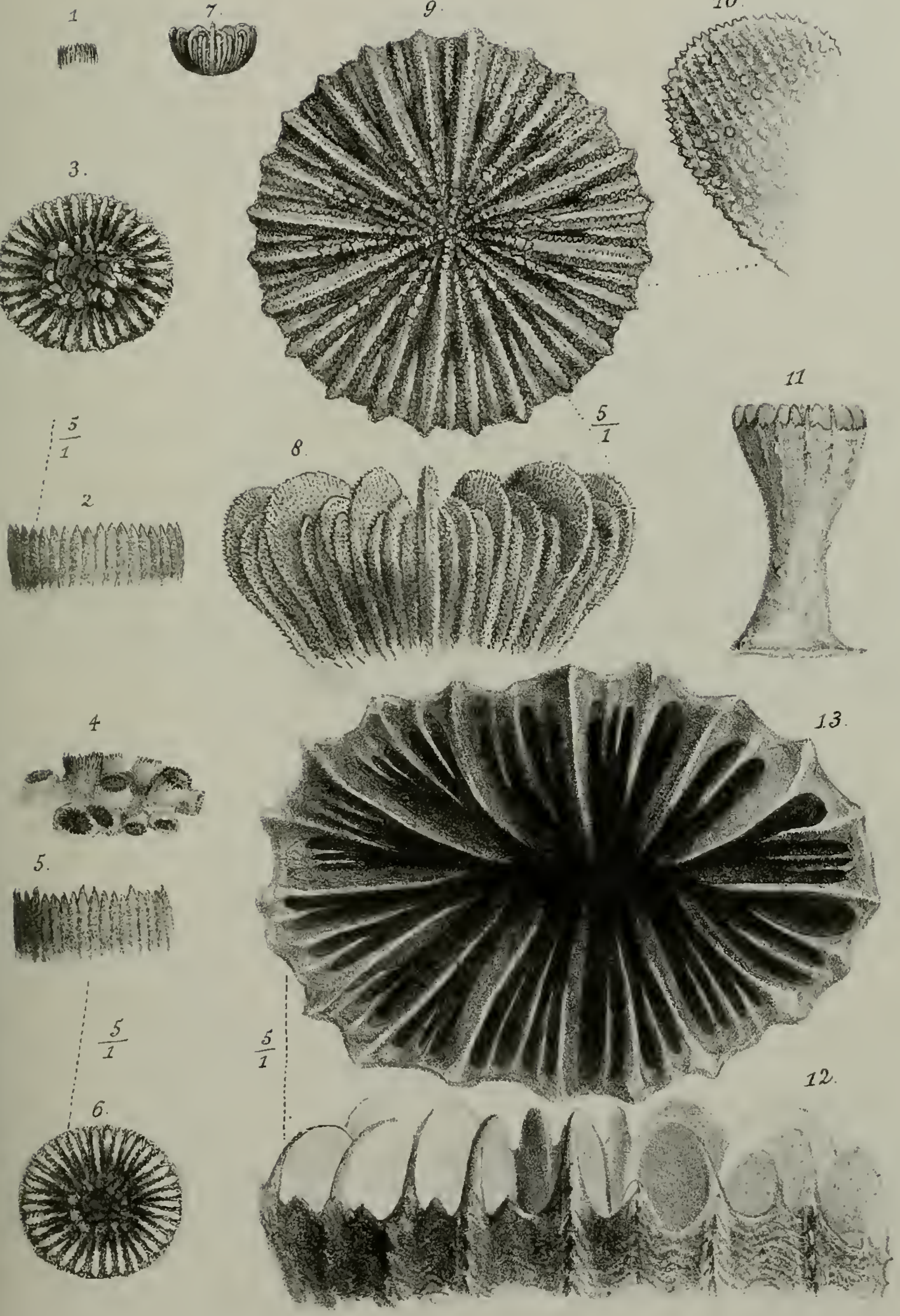
NATURAL HISTORY



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NEW CORALS.

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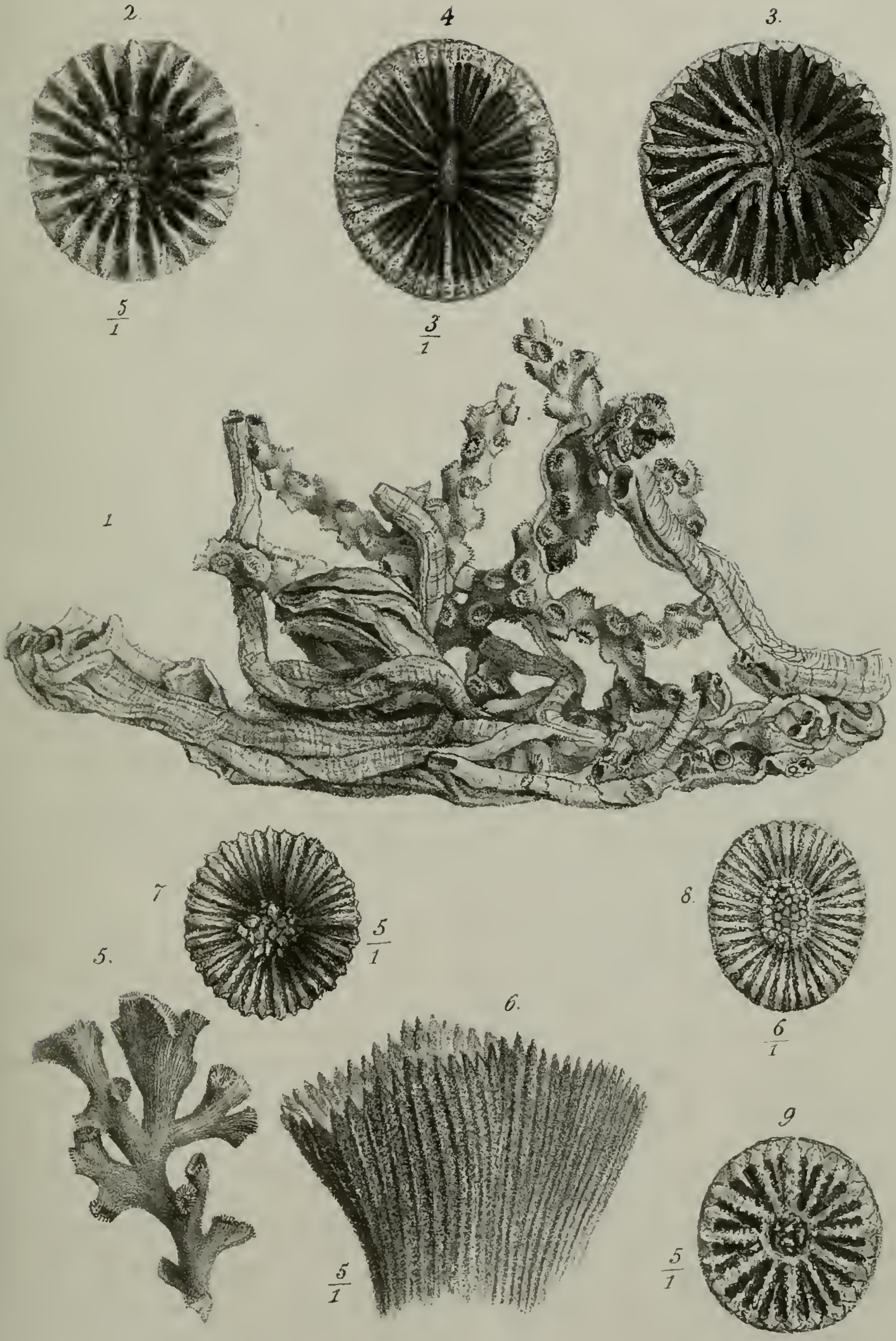

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NEW CORALS.

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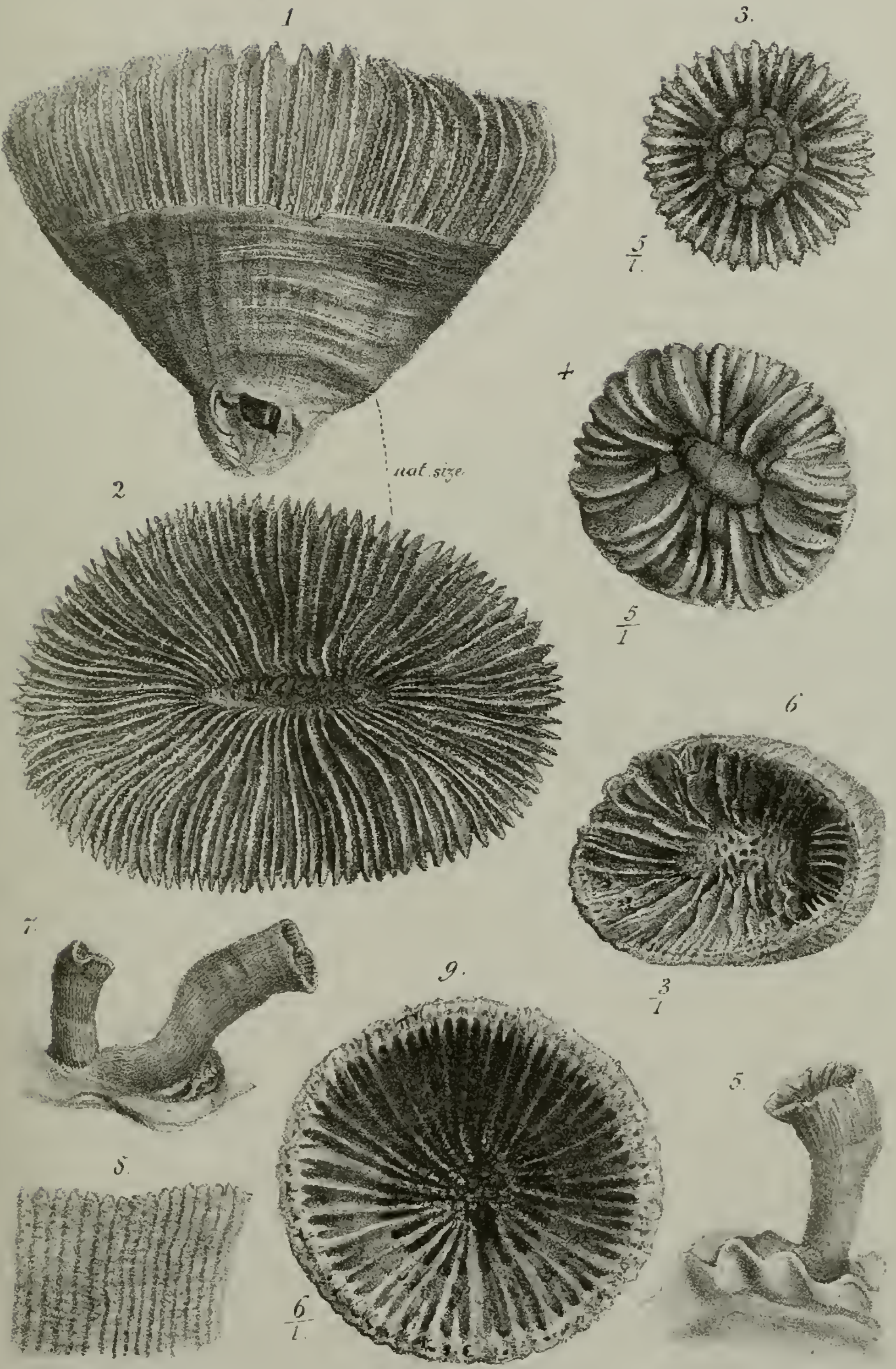

From nat on stone by J Erxleben.

M&N Hanhart imp

NEW CORALS

BRITISH MUSEUM Z D NATURAL HISTORY

Pacific and West-Indian coral-faunas is explained in the essay mentioned above.

Of the new genera, *Polycyathus* and *Agelecyathus* may be said to be like the Astrangiaceæ; but they have not incised septa, and there is no endotheca.

Brachytrochus is a very simple form, whose flat shape is relieved by the presence of teeth to the septa, simulating pali.

Javania is a *Desmophyllum* with a remarkable epitheca; and *Dendrocora* represents in the littoral zone the deep-sea genus *Solenosmilia,* nobis (Trans. Zool. Soc. vol. viii. p. 327).

It has been found necessary to reexamine the species *Sclerohelia hirtella* (a St. Helena coral, with a wonderful amount of calicular variation and recalling the Cretaceous *Synheliæ*), and also *Cyathohelia axillaris* of Japan.

List of new Species.

Conocyathus zelandiæ. Cook's Straits, New Zealand.
Deltocyathus orientalis. Japanese seas, 52 fathoms.
Paracyathus persicus. Persian Gulf.
—— *coronatus.* Nullipore zone in Persian Gulf.
Polycyathus atlanticus. St. Helena.
Agelecyathus helenæ. St. Helena.
—— ——, variety *minor.* St. Helena.
—— *persicus.* Persian Gulf.
Brachytrochus simplex. Gaspar Straits, 12 fathoms.
Javania insignis. Japanese seas, 48 fathoms.
Oculina cubaënsis. Caribbean sea.
Antillia lonsdaleia, Duncan, a variety. Japanese seas.
Dendrocora fissipara. West coast of Africa.
Astrangia minuta. Caribbean seas, littoral.
—— *epithecata.* Caribbean seas, littoral.
Cylicia tenella, variety. Port Natal.
Placopsammia darwini. Galapagos Islands.
Balanophyllia helenæ. St. Helena.
—— *striata.* St. Helena.

List of Species reconsidered.

Sclerohelia hirtella, Pallas, sp.
Cyathohelia axillaris, Ellis & Solander.

List of new Genera.

Polycyathus.
Agelecyathus.
Dendrocora.
Javania.
Brachytrochus.

List of Species, and their Classification.

Suborder SCLERODERMATA.

Section MADREPORARIA APOROSA.

Family TURBINOLIDÆ.

Subfam. CARYOPHYLLIACEÆ.

Conocyathus zelandiæ, sp. n.

Subfam. TROCHOCYATHACEÆ.

Deltocyathus orientalis, sp. n.
Paracyathus persicus, sp. n.
Paracyathus coronatus, sp. n.

Subfam. TURBINOLIDÆ REPTANTES, nov.

Polycyathus atlanticus, sp. n.
Agelecyathus helenæ, sp. n.
Agelecyathus helenæ, var. n.
—— *persicus*, sp. n.

Subfam. TURBINOLIACEÆ.

Javania insignis, sp. n.
Brachytrochus simplex, sp. n.

Family OCULINIDÆ.

Oculina cubaënsis, sp. n.

Family ASTRÆIDÆ.

Subfam. ASTRÆINÆ.

Antillia lonsdaleia, var. n.

Division CLADOCORACEÆ.

Dendrocora fissipara, sp. n.

Division ASTRANGIACEÆ.

Astrangia minuta, sp. n.
—— *epithecata*, sp. n.
Cylicia tenella, var. n.

MADREPORARIA PERFORATA.

Family EUPSAMMINÆ.

Balanophyllia helenæ, sp. n.
—— *striata*, sp. n.
Placopsammia darwini, sp. n.

Species reconsidered.

Family OCULINIDÆ.

Sclerohelia hirtella, Pallas.
Cyathohelia axillaris, Ellis & Solander.

Description of the Species.

Suborder SCLERODERMATA.

MADREPORARIA APOROSA.

Family TURBINOLIIDÆ.

Subfam. CARYOPHYLLIACEÆ.

Genus CONOCYATHUS, D'Orbigny.

This genus is thus described by Milne-Edwards and Jules Haime in their 'Hist. Nat. des Corall.' vol. ii. p. 25 :—

The corallum is simple, trochoid, straight, free, and without a trace of adherence. The costæ are not lamellar; the septa are exsert, being strongly spined laterally; the columella is wanting or is rudimentary; and there are well developed pali before the septa of the penultimate cycle.

The genus resembles *Turbinolia* without a columella and with pali. Its solitary species, a well-marked form, with three cycles of septa, and six large pali, was found in the Mayence Tertiary deposits, and was called by D'Orbigny *Conocyathus sulcatus*, from the grooved appearance of its outside.

Two specimens of simple corals were dredged up in Cook's Straits, New Zealand, from no very great depth, and they were evidently within this remarkable genus, differing very slightly from the fossil form.

CONOCYATHUS ZELANDIÆ, sp. n. (Plate XXXVIII. figs. 1–3.)

The corallum is conical, the calice being circular in outline; but the lower third of the corallum diminishes suddenly, there being fewer costæ there than above. The base is rounded, and is costulate, the costæ are in ridges, and have distinct intercostal spaces. There is no columella; but six large upward-projecting pali start around the axis, and are placed before each secondary septum. There are three cycles of fully developed septa, and there are three corresponding cycles of costæ; and in addition there are costæ of the fourth cycle in each of the six systems; but they correspond to rudimentary septa.

Height $\frac{3}{10}$ inch. Diameter of calice about $\frac{1}{10}$ inch.

The resemblance of this coral, at first sight, to a Turbinolian without a columella is very striking. The pali are unusually large; and the existence of the costæ, and in relation with rudimentary septa of the fourth cycle, is very remarkable.

Subfamily TROCHOCYATHACEÆ.

DELTOCYATHUS ORIENTALIS, sp. n. (Plate XXXVIII. figs. 4–7.)

The corallum is short, turbinate, widely open at the calice, and it has a circular spot to its base, which is without costæ. The columella is exceedingly small; the primary septa are very exsert; and the costæ are subequal, crowded, granular, and project from the wall. The septa are in four cycles; but the higher orders are incomplete in some systems. The pali are small and lower before the tertiaries, and prominent and tall but not broad before the secondaries. All the septa and the pali are closely granular.

Height of coral $\frac{1}{5}$ inch. Breadth of calice $\frac{1}{5}$ inch.

Locality. Japanese seas. N. lat. 34° 12′, E. long. 136° 20′, in 52 fathoms. Collected by Capt. St. John.

PARACYATHUS PERSICUS, sp. n. (Plate XXXVIII. figs. 8–10.)

The corallum is short, and the base is broader than the calice, which is shallow and open. The costæ are well developed, rounded and subequal. The septa are close and crowded, broad, not exsert, long and granular at the sides; and there are not quite three cycles. The pali are broad and short, and look like continuations of the primary and secondary septa. The columella is small and concave.

Breadth of calice $\frac{1}{12}$ inch. Height of corallum $\frac{1}{12}$ inch.

Locality. Dredged up from Persian Gulf on Nullipore.

PARACYATHUS CORONATUS, sp. n. (Plate XXXVIII. figs. 11–13.)

The base is broad, but not so wide as the calice; and the whole is short, the costæ being very distinct, prominent, unequal, and extending to the base. The calice is elliptical in outline, and the larger septa are exsert and rounded. The calice is shallow; and a circular ring of septa-like pali arises around the rather small columella. The septa are in incomplete four cycles; and there are about 20 prolongations into the inner circle. These pali are long and arched, the whole presenting the appearance of an intercalicular gemmation.

Height of corallum $\frac{2}{10}$ inch. Breadth of calice $\frac{1}{10}$ inch.

Locality. On a shell in the Persian Gulf.

There is often much difficulty in deciding whether one of the crowns of pali are really such, or only long spines attached to the septa on their inner margin near the central space.

The importance of deciding the true character of the structures is great; for whilst the septal spine may be of specific importance, the presence of the pali as independent structures is generic; for it involves the presence of other tissues—such, for instance, as an extra crown of soft tentacles. Every one who has seen many of the small sessile corals usually called *Astrangia*, *Phyllangia*, and *Ulangia* amongst the Astrangiaceæ must have felt this difficulty. In some the spinose nature of the false palus is evident; but in other species an arbitrary custom appears to have decided that such and such are not septal structures but pali.

In the Astrangiaceæ there must be evidences of endothecal structure in the form of dissepiments, although Milne-Edwards says it is "peu abondante." Moreover the septa must have their free margins more or less incised, and not plain. The origin of the corallites from a basal expansion is part of the diagnosis; but of course this fails with regard to the parent before basal expansions, or stolons have been cast forth.

If a corallite simply increases by basal expansions, or stolons, it is not necessarily one of the Astrangiaceæ; for budding can take place in species of other groups so low down and close to the base that it appears to be, and may be, essentially basal. This is seen in a specimen of *Oculina cubaënsis* from the Caribbean, when *Serpulæ* have kept the branches from rising as usual. Moreover in the *Sclerohelia* from St. Helena there are some corallites close to the base, and continuous with it, which are not distinguishable from it.

Corallites springing thus from a base more or less closely, and not having endotheca or serrate-edged septa, are not Astrangiaceæ; so that without the necessity of determining what are and what are not pali, the difficulty in classification is somewhat removed.

These observations are necessary, in order that the nature and classification of several corals which closely resemble each other may be understood, and that their separation or not from the Astrangiaceæ be comprehended.

TURBINOLIDÆ REPTANTES.

Corals rising from a prolongation of the basal structures, sometimes distant, sometimes very close. The septa are plain; and there is no endotheca.

This diagnosis forms a group amongst the Turbinolidæ like that of the Astrangiaceæ of the Astreaceæ; and this group is as it were linked on to the endothecate corals by the Oculinaceæ, which occasionally assume this basal method of growth. I believe "occasional" is a correct term, and that the force of circumstances which prevent the upward growth, and necessitate a basal one, is accompanied by trifling changes in the septal arrangement, and in that of the columella also; so that a species may present itself under two aspects. But until more is known of the soft parts, it is best to make them basal growers when they are only found in that manner.

Genus POLYCYATHUS.

There is an epitheca covering the costæ; pali are present; and the columella is usually deeply seated.

POLYCYATHUS ATLANTICUS, sp. n. (Plate XXXVIII. figs. 14–16.)

The corallites arise close to the bases of their neighbours, and grow more distinct and distant with age. Their shape is cylindro-conical, with a broad base and an elliptical calice, which is circular in outline in young species. The epitheca is very decided in young, and well seen in the old specimens. The septa are irregularly arranged; and in the largest calices there are four complete cycles and part of a fifth. The primary and secondary septa are the most distinct and exsert, being granular at the sides, but not incised on the margin. The smaller septa do not reach far from the wall. The margin of the calice, round and stout in the young corallite, is rather wavy and even angular in the largest. The costæ are subequal, granular, and covered by the epitheca. The columella is deeply seated, small, and ends in a few papillose spines. The pali resemble the spines of the columella, but are usually larger and, indeed, longer than the smaller septa before which they are placed. The pali are placed before the tertiaries and secondaries, those of the tertiaries being nearer the margin of the calice. Sometimes the pali are double or bilobed before these septa, but not before the secondaries. There is no endotheca.

Height $\frac{4}{10}$ inch. Breadth of calice $\frac{3}{10}$ inch.

On an *Ostrea* from St. Helena.

Genus Agelecyathus.

There is no epitheca; the costæ are well developed, especially near the calices; the septa are more or less exsert. There are pali, a columella, and no endotheca.

Agelecyathus helenæ, sp. n. (Plate XXXIX. figs. 4–6.)

The corallum incrusts; and the corallites, united by a common base, are wide apart and short. The calices are elliptical or round, open and moderately deep. The columella is small, papillose, and deeply seated; the septa are not crowded, but are stout, granular, and unequal. The primaries and some secondaries are exsert. The pali are long, thin, papillose, and are placed before the secondaries and the tertiaries. The costæ are flat, unequal, extend to the base, and are granular.

Diameter of calice $\frac{2}{10}$ inch.

Locality. On an *Ostrea* from St. Helena.

The variation of the size and shape of the pali and septa on the same corallum is interesting. In some they are both broad and sharply granular laterally.

Var. minor.

A smaller series of corallites, and with all the specific attributes, is on the under valve of the same *Ostrea*.

Agelecyathus persicus, sp. n. (Plate XXXIX. figs. 1–3.)

The corallites are united by stoloniferous expansions; and some are distant, whilst others are close. The corallites are cylindrical, slightly narrower at the base, and tumid below the calice. The costæ are distinct, wide, granular, unequal, and flat. The septa are unequal, the primaries being the shortest, and those of the higher cycle much smaller: but in some calices the septa are alternately large and small. Some calices have very wide septa, largely granular at the sides; others have them thinner; and all are short. There are three cycles, or some septa of the fourth may be present. The columella is small and papillose, and deep in the rather deep fossa. The pali are small, and either thick or papillose. They are placed before the tertiaries, and sometimes before the secondaries.

The variability of the pali, and size of the septa, and the septal number is very remarkable in the same corallum.

Expanse of corallum 1 to 2 square inches. Height of corallites $\frac{1}{20}$ to $\frac{4}{10}$ inch. Breadth of calice $\frac{1}{12}$ to $\frac{1}{10}$ inch.

Locality. Dredged up out of Persian Gulf.

Subfam. Turbinoliaceæ.

Javania, gen. nov.

The corallum is simple, tall, compressed at the calice, and adheres by a broad base. There is a complete epitheca, dense inferiorly, and pellicular superiorly. The larger septa are very exsert; and the tertiaries have costæ much broader than they are. The costæ of the primary and secondary orders project. There is no columella; and the calicular fossa is very deep.

The genus is allied to *Desmophyllum*, Ehrenberg; but the absence of exsert higher orders of septa and the dense epitheca separate it from this form.

JAVANIA INSIGNIS, sp. n. (Plate XXXIX. figs. 11–13.)

The corallum has a broad incrusting base, above which it is smaller and cylindrical, and it expands gradually, being compressed from side to side. The calice is elliptical, and the axes are on the the same plane; the septa are very unequal; and there are four cycles and part of the fifth. There are twelve nearly equal exsert septa, and twelve tertiaries which are less exsert and smaller. Between these septa there are in some parts three small and well-developed septa, and sometimes two or none. The larger septa are nearly without ornamentation and are thick; and they approach the long-axis space, deficient in columella. The epitheca is stout and plain inferiorly, but towards the calice it becomes pellicular and arranged in series of transverse festoons. These curve up to the prominent and bluntly serrate costæ, which correspond to the septa of the three front cycles. The other septa have no costæ. The calicular margin has the epitheca continued to it; and the costæ of the primaries and secondaries are exsert and wide, as are those of the tertiaries which form the costal prolongations down the wall.

Height $1\frac{1}{5}$ inch.

Locality. Japanese sea, N. lat. 34° 13′, E. long. 136° 13′, 48 fathoms. Collected by Capt. St. John.

There is some difficulty in classifying the next species, on account of the very arbitrary manner in which certain modifications of the internal parts of the septa are decided to be pali. Pali, in the strict and proper sense should arise from the internal base of the corallite, and should be placed between certain septa and the columella, or the axial space, when this last is deficient. They may adhere to the septa; but in either case the ornamentation and general arrangement of the sclerenchyma of the pali differ from those of the septa. A row of pali infers an extra row of tentacles. But the term pali is given to prominent dentations of the inner margin of septa, or to the inner margins when their dentition differs from that of the rest of the laminæ, in *Phyllangia* for instance. This is not correct: such structures may be termed papillose; but this will not permit of the corallites being classified as having pali. In the species about to be described the inner part of all the septa is more or less peculiarized by broad, widely separated, complicated granulations, or rough papillæ. The linear series of these ornaments simulate pali; but I am not disposed to admit that they are those accessory structures. Were they pali, the form would fairly come near to Gray's *Heterocyathus*, as it stood first of all—not as one of the synapticulate corals according to Milne-Edwards and Jules Haime, but a true member of the old group of Trochocyathaceæ.

As the form has no endotheca, is simple, and without pali, it comes within the Turbinolinæ, in the neighbourhood of *Desmophyllum*, *Smilotrochus*, and *Discotrochus*; but it differs from all.

Like the two well-known Japanese simple corals, the corallum has its base surrounding a shell; but in this instance the small *Ditrupa*-like annelid does not always interfere with the symmetry of the base.

Genus Brachytrochus.

The corallum is very short, free, or incrusting annelid-shells. The calice is circular, and deep centrally; there is no columella. The septa are exsert and papillose; the costæ are well developed, except on the rounded centre of the base, where they merge into a granular structure.

Brachytrochus simplex, sp. n. (Plate XXXIX. figs. 7–10.)

The calice is widely open, and the floor of the fossa is visible. The septa are in six systems, and there are four perfect cycles in each; the primaries are the largest, the most exsert, and project the most internally and externally; the secondaries are slightly smaller than the primaries, and larger than those of the third order. The fourth and fifth orders are the smallest, and rather approach the tertiaries.

All have large and wide papillæ internally; and those of the third and higher orders of septa reach furthest from the axis. The septa are rounded faintly and are thin and exsert.

The costæ are profusely granular. The inner granulations, or papillæ of the septa, radiate, as it were, from where the columella might have been.

Height $\frac{3}{20}$ inch. Breadth $\frac{4}{10}$ inch.

Locality. Gaspar Straits, 12 fathoms. From the Liverpool Museum.

Family Oculinidæ, Ed. & H.

Oculina cubaënsis, sp. n. (Plate XL. figs. 1, 2.)

The corallum incrusts dead Polyzoa and *Serpulæ*, and rises also in the form of irregular stems which branch and often coalesce. Gemmation sometimes lateral and alternate, at other times in spiral series, and without order.

The calices are not very prominent, and are moderately deep. The columella is extremely small and trabecular; the septa are alternately large and small; and the primaries and secondaries are exsert, arched, and finely spinulose at their margin. There are rarely three complete cycles. The pali are before all the septa except the last, are long, rather papillose at the surface, tall, and their inner end meets the almost rudimentary columella. The costæ are often well seen over the sides and running between the corallites; at other times they are wanting. They are often unequal, a large one being followed by a very small one. All are minutely granular, so that they feel as if spiny.

Fissiparity is rare.

Breadth of calices $\frac{1}{14}$ inch.
Locality. Caribbean Sea.
This is allied to *Oculina tenella*, Pourtalès.

SCLEROHELIA HIRTELLA, Pallas, sp. (Plate XLI. figs. 3, 4.)

This fine species has been found at St. Helena, and as yet nowhere else; and no other form comprehended by the genus has been described. On a large *Ostrea* from the coast of St. Helena, there are several specimens which would at a glance be referred to the genus *Sclerohelia*; and their examination, whilst it confirms this impression, proves the extraordinary amount of variation which the calices may present.

The specific diagnosis is as follows:—

The corallum has a thick stem and many branches, the cœnenchyma being very thick, glistening, and finely granular. The costal striæ are slightly marked. The calices are alternate and opposite on the young branches and are placed irregularly on the larger ones, being generally but slightly prominent and shallow. The columella is well developed, being made up of 7 or 8 papillæ. There are three complete cycles of septa; and some of the fourth are found in one or two systems. The septa are very unequal and very projecting at the margin. The pali are well developed, and are placed before the secondary septa. Diameter of the calices $\frac{1}{5}$ inch.

A comparison between this structural description and that which can be given of the specimens on the *Ostrea* is very instructive.

1. A large dendroid mass having three large branches, two of which coalesce after some ramifications have been given off.

Calice 1. This is on the thick branch; and its base is costulate, and the surface granular. The shape is elliptical; the septa are in six systems; and there are four perfect cycles in two systems, an incomplete fourth cycle in one, and three complete cycles in the others. The columella is composed of three oblong masses in a line; the pali are thin, rather long, and are placed before two secondaries and two tertiaries on one half, and before two tertiaries and two secondaries in the other.

In the next calice to no. 1 (2) the columellary masses have united and have assumed a dense structure, arched above. No. 3 is a calice on a small branch, the calice being rather more circular in outline; the columella has two side-papillæ; and two of the pali are wanting.

And in another calice (4) the columella is as in no. 2; but the pali are thick and broad.

On other branches of the same corallum there are some calices with four cycles of septa in four systems, and the fifth orders wanting only in the half of the other systems; and in some the columella is long and solid, or long and incomplete, or round and made up of many processes.

On the surface of the trunk there are some calices which surmount rather elongated buds, and the septal number is not over 24, and the columella consists of one twist of a band-like structure greatly resembling a styloid columella at the top.

2. A small, stunted corallum on the same shell as the last, has well-developed calices and costal markings in some places, but, as in no. 1, not everywhere. The calices are of two kinds—those with a large columella made up of several trabeculæ forming a more or less globular or circular mass, and those with elongated columellæ and well-developed pali.

3. A small trunk on the lower side of the same shell presents calices with a large columella and small pali. The costæ are very marked around some calices.

These variations in the calicular arrangement in the same corallum and in the same species are very significant, and they prove that the presence or absence of costæ, the septal number, the number and dimensions of pali, and the size and development of the columella must not be taken separately to decide specific destinctions if some of the other structures retain their special characters.

This coral is a very interesting species, as it is only found off St. Helena; but it, when worn, and when the columella is small, singularly resembles the *Synheliæ* of the chalk.

CYATHOHELIA AXILLARIS, Ellis & Solander, sp.

This common species, from the Japanese seas, is described in Milne-Edwards and Jules Haime's 'Hist. Nat. des Coral.' vol. ii. p. 110. They omit to state that the pali are situated before the primary, secondary, and tertiary septa, and that in young calices the columella is on a much lower level than the tall papillæ of the crown of pali. The thickness of the septa varies according to age.

Family ASTRÆIDÆ.

Subfam. ASTRÆINÆ.

Genus ANTILLIA, Duncan, Quart. Journ. Geol. Soc. 1864, p. 28.

ANTILLIA LONSDALEIA, Duncan, Quart. Journ. Geol. Soc. vol. xx. pl. iii. figs. 4–4*c*.

A variety of this Miocene species which I described from the Tertiaries of San Domingo is found in the Japanese seas at no very great depth. It was sent over by Capt. St. John; and on examining the two specimens I could not distinguish a specific difference between them and the fossil form. The arrangement of the lobed septa, their high cyclical number, their ornamentation and endotheca are most close in their resemblance. The general shape differs a little; and the compressed form of the calice constitutes a variety only.

The side view of the corallum is given in Plate XLI. fig. 1, and the details of the calice in Plate XLI. fig. 2.

Division CLADOCORACEÆ.

DENDROCORA, gen. nov.

The corallum is bushy, the ramifications being frequent from all parts, short and frequently forming groups in one plane. The wall is thick except near the calices; the costæ are distinct, and thicker than the septa. The columella is lax and trabecular, having pali which are placed before the tertiary septa in perfect systems. Fissiparity is common in the terminal calices, and they present short broken series. There is no epitheca. Endotheca tolerably abundant.

This genus differs from *Cladocora* in having no epitheca, in the fissiparous division, and in the thickness of the walls. It is distinguished from *Pleurocora*, to which it is more closely allied than to any other genus, in its general shape and the fissiparity of the terminal calices; and it is separated from *Goniocora* by having pali.

Dendrocora fissipara, sp. n. (Plate XL. figs. 5–7.)

The corallum is small and bushy, the branches being slender; the terminal calices are elongate, and undergo fissiparity by the division of the calice by a large septum. Ordinary calices are round, shallow, with exsert septa, very granular, in vertical lines, and slightly incised; and the columella has an open reticulated form, with processes centrally, and pali at the side. Septa in 6 systems, and usually three cycles in each, a fourth never being complete. The pali are before the third septa. The costæ are broader than the septa at the calice, and are sharply granular and very distinct. Height of coral 2 inches. Breadth of ordinary calice $\frac{1}{12}$ inch, of a series $\frac{4}{10}$ inch.

Locality. Off Bonito, West Africa. $4\frac{1}{2}$ fathoms. Liverpool Museum.

Division Astrangiaceæ.

Astrangia minuta, sp. n. (Plate XL. fig. 8.)

The base is larger than the centre; and the costæ are moderately developed. The calice is very open and shallow; the columella is well seen, and consists of papillæ which resemble those of the smaller septa. The corallite is very short; and there are three complete cycles of septa, which are short, granular, unequal, arched, and slightly excised.

Breadth of calice $\frac{1}{10}$ inch. Height of corallum $\frac{1}{30}$ inch.

Locality. On a reef-coral from the shores of San Domingo.

Astrangia epithecata, sp. n. (Plate XL. fig. 9.)

The corallum is short, the calices open and shorter than the base; the fossa is shallow; and the epitheca comes to the margin. The columella is small, being formed by a circle of trabeculæ joining the septal ends. Septa wide apart, unequal, usually long, and in three cycles.

Breadth of calice $\frac{3}{20}$ inch. Height of corallum $\frac{1}{20}$ inch.

Locality. On West-Indian recent reef-coral.

A group of corals associated with several little Brachiopods of the genus *Krausia* (probably a variety of *Krausia persicum*), from Port Natal, in South-eastern Africa, presents some interesting results to a careful investigation. The corallites have the aspect of the genus *Cylicia*, Dana, as they are crowded, spring from a basal expansion, have a well-marked epitheca, deep fossæ, and the septal edge concave. At first sight the whole would be associated with

Cylicia tenella, Dana, which is placed amongst the Astrangiaceæ; but the following structural peculiarities render this a matter of doubt.

1. Some corallites attain the height of $\frac{4}{10}$ inch nearly equalling 10 millimetres.

2. All the corallites do not arise from the stoloniferous base, but some spring from others between the calice and the base; but it does not appear that these are buds. They are probably the result of polypes that became fixed on to the epitheca of the original one in their mobile stage.

3. The epitheca is shown perfectly in small corallites; but the larger and even some of the smaller have distinct but small costæ, which are marked with granules, and which join the angular and very slightly exsert ends of the septa.

4. The septal arrangement is irregular. There are six primary septa, and a number of others, the majority resembling the primaries. Usually there are 20 large septa reaching into the calice; and between each pair there is often, but not invariably, a rudimentary septum. In some calices the primaries appear to be five in number; and in a bud there is one primary and a small septum on either side of it. All are granular and incised more or less.

5. The endotheca is absent, except within the calice of two specimens, where it is extending between the septa near the wall, as if commencing to occlude the floor of the calice.

6. The columella is formed of processes from the septal ends, is small, and has three or more beautiful granular ornaments on the points where the reticulations meet.

The incised nature of the larger septa along their slanting internal margin is evident. Sometimes the septa do not even reach to the calicular margin; and some appear as spines from the inner part of the calicular wall. The third cycle is rarely complete if the rudimentary septa, which project between the larger $\frac{1}{50}$ inch or a little more, are wanting, as in the diagnosis of Milne-Edwards and Jules Haime, 'Hist. Nat. des Corall.' vol. ii. p. 608; and the third cycle do not always bend towards the secondary septa. If the rudimentary septa are counted, the fourth cycle is rarely complete.

The species *Cylicia tenella* and *C. verreauxi*, Ed. & H., differ in respect of the perfection of the third and imperfection of the fourth cycle, this last never being perfect in either. There is no specific distinction between them; and therefore the last-named species had better disappear. The form under consideration I deem a variety of *Cylicia tenella*, var. *natalensis* (Plate XL. fig. 3).

MADREPORARIA PERFORATA.

Family EUPSAMMINÆ.

BALANOPHYLLIA HELENÆ, sp. n. (Plate XLI. figs. 5, 6.)

The corallite has a small base, a narrow bent cylindrical stem, and a suddenly large calicular opening.

The costæ are not exsert at the calice, are distinct to the base, slightly prominent, unequal, very numerous, perforated here and there, close together, and spinulosely granular, the grains being few and large. There is an epitheca, which reaches upwards from the base a short distance; and the wall is thin and reticulate. The calicular fossa is wide and shallow; the columella is oval and moderately large; and there are more than five cycles of septa in each of the six systems. The septa are thin, not exsert, long, and unite not far from the columella, and near the wall the larger are perforate.

Height $\frac{6}{10}$—$\frac{8}{10}$ inch. Breadth of calice $\frac{3}{10}$—$\frac{4}{10}$ inch.

Locality. St. Helena, on an *Ostrea*; probably 11 fathoms.

(Sent as having come up with an anchor from a great depth.)

Balanophyllia striata, sp. n. (Plate XLI. figs. 7–9.)

The corallite is tube-like, there being but slight alteration in the breadth of the cylindrical and bent form during growth; it is long, slender, bent, and fixed by a wide base. The costæ are numerous, subequal, close, faintly granular; and the synapticulæ are visible on the intercostal spaces where the costæ have been worn, but not otherwise. There is an epitheca inferiorly. The costæ do not project upwards at the calice; but those of the primary and secondary septa and sometimes of the tertiary are a little higher than the others. The wall is thin at the margin, and the reticulation is slight. The calice is circular in outline, very deep; and the columella is very small, and appears as a few scattered papillæ. The septa are thin, long, not prominent, and do not reach far into the centre at the margin; but the larger reach far inwards at the base of the fossa. The larger are plain, and the rest are denticulate. The union is made close to the wall and halfway down the calice.

Height $1\frac{1}{10}$ inch. Breadth of calice $\frac{3}{10}$ inch.

Locality. Found with the species just described.

Genus Placopsammia, Reuss.

Placopsammia darwini. (Plate XL. fig. 4.)

The corallum has a broad ascending base, which narrows suddenly and is continued upwards as a cylindrical tube-like corallum, one diameter being slightly greater than the other. Buds project from the same height as the parent, in a whorl, and pass upwards and outwards. There is no epitheca; and the costæ are well developed, nearly equal, broad, distinct, and sharply multigranular. The intercostal spaces show synapticulæ, and are distinct. The calice is elliptical in outline, and rather deep; the margin is densely reticulate and stout; and the septa, barely exsert, are thin, long, and do not project much from the margin. There are twelve nearly equal septa (1 & 2); and the tertiaries are not so well developed as those of the fourth cycle. All these last are rather spiny on their internal margins; and their approach and contact with each other is very slight and low down. There are four perfect cycles, and in one or two systems an order of the fifth. The columella is deeply seated, is well separate from the septa, is lamellar and granular, the granules being long. It is long, arched, and thin at the surface.

Height of corallum $1\frac{1}{4}$ inch. Breadth of calices $\frac{3}{10}$–$\frac{4}{10}$ inch.

Locality. Galapagos Islands. Collected by Mr. Darwin.

EXPLANATION OF THE PLATES.

Plate XXXVIII.

Fig. 1. *Conocyathus zelandiæ*, nat. size.
2. Ditto, coral, magnified.
3. Ditto, calice, magnified.
4. *Deltocyathus orientalis*, side view.
5. Ditto, side view, magnified.
6. Ditto, calice, magnified.
7. Ditto, a septum, magnified.
8. *Paracyathus persicus.*
9. Ditto, side view, magnified.
10. Ditto, calice, magnified.
11. *Paracyathus coronatus*, side view.
12. Ditto, side view, magnified.
13. Ditto, calice, magnified.
14. *Polycyathus atlanticus*, side view.
15. Ditto, side view, magnified.
16. Ditto, calice, magnified.

Plate XXXIX.

Fig. 1. *Agelecyathus persicus*, side view.
2. Ditto, side view, magnified.
3. Ditto, calice, magnified.
4. *Agelecyathus helenæ*, group.
5. Ditto, costæ, magnified.
6. Ditto, calice, magnified.
7. *Brachytrochus simplex*, side view.
8. Ditto, costæ, magnified.
9. Ditto, calice, magnified.
10. Ditto, septum, magnified.
11. *Javania insignis*, side view.
12. Ditto, upper part, side view, magnified.
13. Ditto, calice, magnified.

Plate XL.

Fig. 1. *Oculina cubaënsis*, group.
2. Ditto, calice, magnified.
3. *Cylicia tenella*, var., calice, magnified.
4. *Placopsammia darwini*, calice, magnified.
5. *Dendrocora fissipara*, nat. size.
6. Ditto, costæ, magnified.
7. Ditto, calice, magnified.
8. *Astrangia minuta*, calice, magnified.
9. ——— *epithecata*, calice, magnified.

Plate XLI.

Fig. 1. *Antillia lonsdaleia*, side view, nat. size.
2. Ditto, calice, nat. size.
3. *Sclerohelia hirtella*, calice, magnified.
4. Ditto, second calice, magnified.
5. *Balanophyllia helenæ*, nat. size.
6. Ditto, calice, magnified.
7. *Balanophyllia striata*, nat. size.
8. Ditto, costæ, magnified.
9. Ditto, calice, magnified.

3. On some Cranial and Dental Characters of the existing Species of Rhinoceroses. By William Henry Flower, F.R.S., V.P.Z.S.

[Received May 15, 1876.]

While engaged lately in cataloguing the osteological specimens of the genus *Rhinoceros* in the Museum of the Royal College of Surgeons, and at the same time, through the kindness of Dr. Günther, examining those at the British Museum (the two collections comprising a total number of fifty-four skulls), several points in relation to the distinctive characters of the different species came under my notice, which I think may be worth bringing before the Society.

The principal distinguishing characters in the skeleton, dentition, and even the folds of the skin, of three distinct forms of Asiatic rhinoceroses were clearly and concisely pointed out by Cuvier in the third volume of the last edition of the 'Ossemens Fossiles' (1834). De Blainville *, Duvernoy †, and Blyth ‡ have also added to our knowledge of the same three forms, which in fact appeared to be well established as the only ones existing in that region of the world. The late Dr. Gray, however, with far more abundant material at his disposal than either of the above-named zoologists, came to very different conclusions from them, both as to the number, distinctive characters, and relations of the various species of the group §; and it is partly with the view of ascertaining how far his views can be accepted that the observations about to be recorded have been made. It is the more necessary that this should be done without further delay, as Dr. Gray's arrangement of the species has already been adopted in zoological and palæontological literature ||.

As is well known, the existing Asiatic Rhinoceroses are sharply differentiated from those of Africa by the presence, throughout life, of well-developed and functional incisor teeth. The Museum of the College of Surgeons contains eighteen skulls of rhinoceroses of the former group of various ages, most of them, unfortunately, without locality. The British Museum contains twenty, making a total of thirty-eight Asiatic skulls, upon which the following observations are based.

The whole of these, in my opinion, can be grouped into three

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* Ostéographie des mammifères. Tome iii. "Rhinocéros" (1846).

† "Nouvelles études sur les Rhinocéros fossiles," Arch. du Mus. t. iii. 1854–55.

‡ "A Memoir on the living Asiatic Species of Rhinoceros," J. Asiat. Soc. Bengal, xxxi. 1862, p. 151.

§ "Observations on the preserved Specimens and Skeletons of the *Rhinocerotidæ* in the collection of the British Museum and Royal College of Surgeons, including the Descriptions of three new Species," P. Z. S. 1867, p. 1003: mostly reprinted, with the illustrations, in the 'Catalogue of the Carnivorous, Pachydermatous and Edentate Mammals in the British Museum,' 1869.

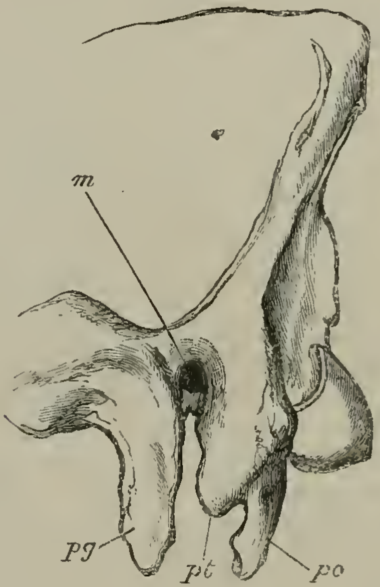
|| See R. B. Foote, *Rhinoceros deccanensis*, 'Palæontologica Indica,' 1874.

distinct types, and no more, these three exactly coinciding with those described by Cuvier. Whether more species exist of which we have as yet received no specimens, or whether any of these types, as I have called them, represent several species separated by characters, external or anatomical, not available at present, I cannot say, especially in the prevailing uncertainty of the use of the word "species." I only mean to imply that there is nothing that I can distinguish in the materials at hand to justify their further separation.

These three are (arranged according to size) :—1. *R. unicornis*, Linn., = *R. indicus*, Cuv. (R. A. 1817); 2. *R. sondaicus*, Cuv. (in Desmarest, Mamm. 1822), = *R. javanicus*, F. Cuv. & Geoff. (Mamm., 1824); 3. *R. sumatrensis*, Cuv. (R. A. 1817). The skulls of these three species can be distinguished from one another at a glance, at any age.

Leaving out numerous minor characters, for which I must refer to the works previously mentioned, the skull of the last (*R. sumatrensis*) is separated from either of the others by a most readily recognized peculiarity in the structure of the squamosal bone, which I believe has not been generally observed. I should, perhaps, rather say that the peculiarity exists in the former two species, and that *R. sumatrensis*

Fig. 1.



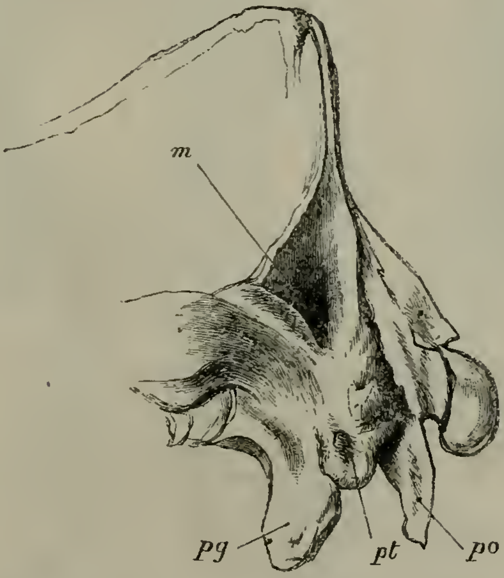
Side view of posterior part of skull of *Rhinoceros sumatrensis*. One fourth natural size.

m, External auditory meatus; *pg*, postglenoid process of the squamosal; *pt*, posttympanic process of the squamosal; *po*, paroccipital process of the exoccipital.

[All the figures are from specimens in the Museum of the Royal College of Surgeons.]

conforms to the normal mammalian type, seen in *Palæotherium, Tapirus, Equus*, &c. It is that the post-glenoid and post-tympanic processes of the squamosal (fig. 1, *pg* and *pt*) do not unite below the meatus auditorius (*m*), and that the latter is, as far as the squamosal bone is concerned, a groove and not a canal, and the floor of the meatus is formed solely by the tympanic; whereas, in both existing one-horned species (fig. 2) these processes (even in the newborn animal) are in contact for a considerable space, and in old animals are ankylosed together, so that the squamosal completely surrounds the meatus as in elephant. The African rhinoceroses conform with the Sumatran in this respect, though the groove is not so wide; so that this conformation of the squamosal may be said to characterize all the existing two-horned species.

Fig. 2.



Side view of posterior part of skull of *Rhinoceros sondaicus*. One fourth natural size.

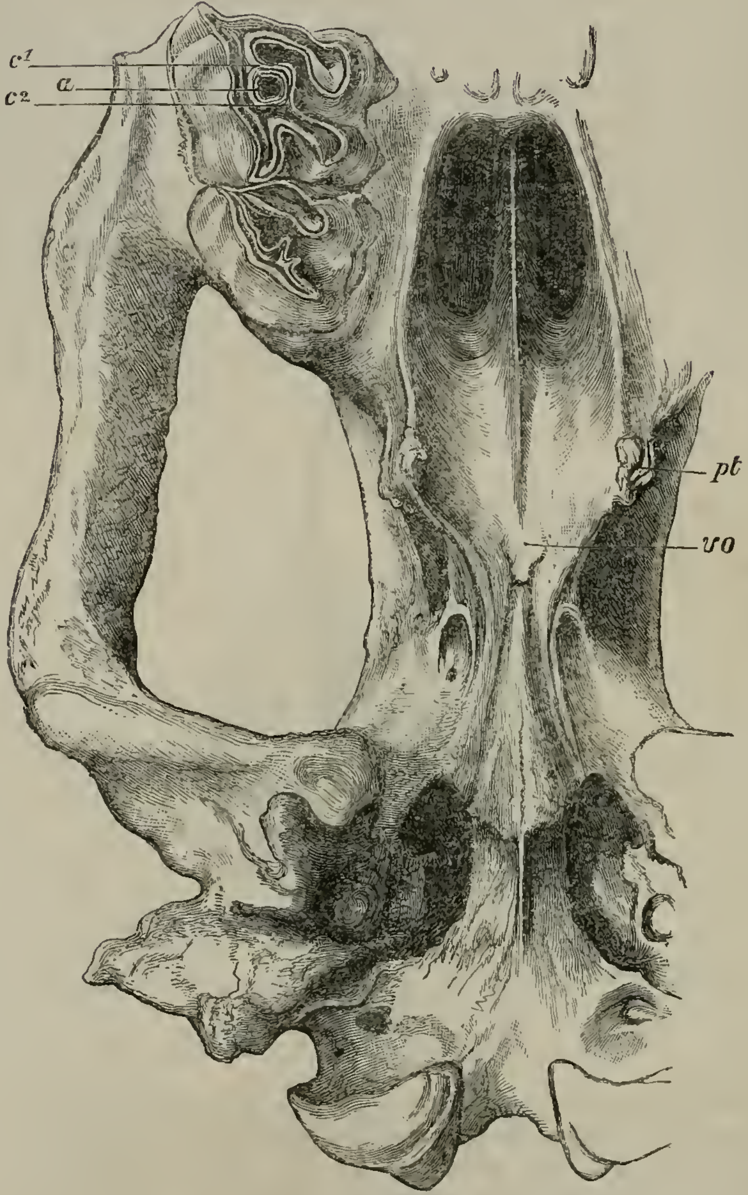
The letters as in fig. 1.

A second character, but far less important, by which the skull of the Sumatran Rhinoceros can be distinguished from that of its Asiatic congeners is the backward position of the occipital crest, which overhangs the nearly vertical occipital surface, whereas in the others the latter slopes forwards and upwards from the condyles to the crest (see figs. 1 and 2).

The slight prominence for the second horn, situated rather anterior to the centre of the conjoined frontal bones, is another diagnostic character.

It is interesting to note that in all these characters, as well as in

Fig. 3.

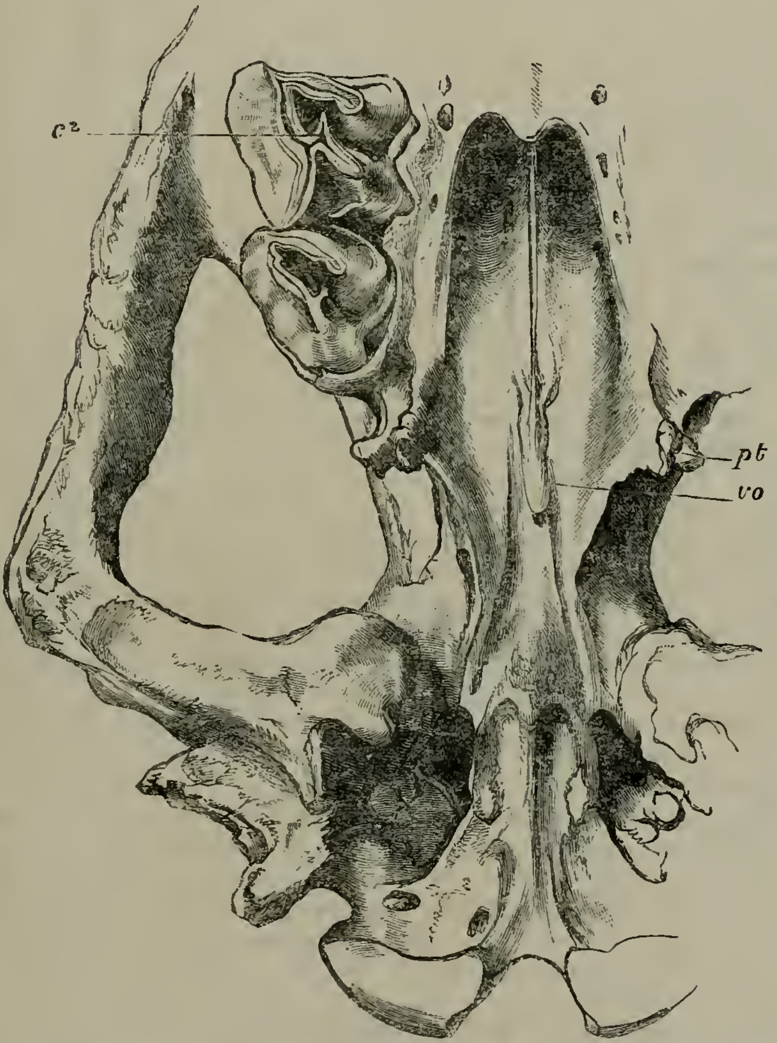


Under surface of hinder part of the skull of *Rhinoceros unicornis*. One third natural size.

pt, pterygoid processes; *vo*, hinder end of vomer; c^1, crista or anterior combing-plate; c^2, crochet or posterior combing-plate; *a*, accessory valley.

the smaller size of the incisor teeth *, this species occupies a somewhat intermediate position between the one-horned Asiatic and the African species.

Fig. 4.



Under surface of hinder part of the skull of *Rhinoceros sondaicus*. One third natural size.

pt, pterygoid processes; *vo*, hinder end of vomer; c^2, crochet or posterior combing-plate.

R. unicornis and *R. sondaicus*, being otherwise more nearly allied must be separated by less decisive, though by no means less constant and scarcely less recognizable characters.

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* And, it may be added, the tendency to the loss of the lateral and the constant absence of the central lower incisors, which are present in all the specimens of *R. unicornis* and *R. sondaicus* examined, with the exception of one aged individual of the latter.

In the former, besides the greater general size and greater length and height of the cranium as compared with breadth, the ascending ramus of the mandible is considerably higher in proportion (a character much relied on by Blyth), so that the whole skull, when mounted upon the lower jaw, is more elevated. The occipital surface also is markedly higher and narrower than in *R. sondaicus*. But in addition to these well-known and obvious characters, there are certain features in the conformation of the base of the skull which are eminently characteristic of the two species, and which when once recognized cannot be mistaken, and are superior for diagnostic purposes to those derived from the general form and proportions, or from parts of the skull the form and dimensions of which are influenced by muscular development, the size of the horns, &c., and consequently very liable to individual variation.

In *R. unicornis* (fig. 3) the mesopterypoid fossa is always narrower than in *R. sondaicus* (fig. 4); and the same condition extends backwards throughout the basi-sphenoid and basi-occipital bones, not only relatively to the size of the skull, but absolutely, the point of junction between these two bones being, in large skulls of *R. unicornis*, actually narrower from side to side than in much smaller specimens of *R. sondaicus*, though generally making a more salient projection downwards. Furthermore, the free ends of the pterygoid processes (*pt*) are compressed and deeply grooved in *R. unicornis*, whereas in *R. sondaicus* they are more flattened and laterally expanded. The hinder margin of the palate is more regularly concave in the former, and has a projection in the middle line in the latter. But the most absolutely diagnostic structural difference is seen in the hinder end of the vomer (*vo*), which in *R. unicornis* is thickened and firmly united by its sides to the base of the pterygoid processes, while in *R. sondaicus* it is thin, lamelliform, pointed, and free, so that in museum specimens it is very often injured or destroyed.

The upper molar teeth of *R. unicornis* and *R. sondaicus* are remarkably unlike for species otherwise so nearly related *; but the same kind of difference exists between the two best-distinguished species of the African forms, *R. simus* and *R. bicornis*; so that the characters of the teeth alone, which have been so much relied on in the case of the extinct species, are not, when taken by themselves, good tests of affinity.

In *R. unicornis*, in the first and generally in the second molar, the *crochet* (or posterior combing-plate) (c^2) curves forwards and usually unites with the *crista* (anterior combing-plate) (c^1) developed from the lamina, so as to cut off an "accessory valley" (*a*) from the extremity of the median sinus †. The premolars and milk-molars present a similar conformation, subject to individual variation. This never takes place in the true molars of *R. sondaicus* (though it may occasionally in some of the milk-molars, especially the second), as in fact the crista is rarely developed in that species, and the crochet is a simple straight free process in the true molars, though often double in the premolars.

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* Professor Owen says truly in his 'Odontography,' p. 594 (1845):—"Even in existing species so nearly allied as the unicorn Rhinoceroses of India and Java, each might be determined by a single detached molar tooth." But his views must have been subsequently modified; for in the descriptive catalogue of the Museum of the College (1853), the skulls of both species are described under the common name of *R. indicus*.

† For an explanation of these terms see Busk, P. Z. S. 1869, p. 410. "Notice

On the other hand the molar teeth of *R. sondaicus* and *R. sumatrensis* are remarkably alike. Mr. Busk, it is true, has pointed out characters by which they can be distinguished *; but they are such as to require great attention on the part of the observer to detect, and one of them, the difference in the relative length and breadth, does not appear to me to bear the test of application to a considerable series of individuals. I may, however, add another, which appears to be tolerably constant, viz. the greater depth of the posterior as compared with the median sinus in *R. sumatrensis*, whence it results that in an extremely worn tooth of the latter there are always two fossæ, the median and posterior, while in *R. sondaicus* the posterior disappears, leaving finally only a single fossa in the wide surface of exposed dentine. In *R. unicornis*, in a corresponding stage of attrition, there are three *fossæ*—the median, accessory, and posterior.

The premolars of *R. sumatrensis* can be distinguished from those of *R. sondaicus* by the complete absence of the double crochet above mentioned as usually, if not always, present in the latter.

It is a curious circumstance that the remains of *R. sondaicus*, though more recently distinguished as a distinct species, are more abundant in our collections than those of *R. unicornis*. In the College-of-Surgeons Museum there are 9 skulls of this species, and 5 of *R. unicornis*. In the British Museum the numbers are respectively 9 and 7. This may be accounted for by the geographical range of the species, as it is *R. sondaicus* which inhabits the Bengal Sunderbunds, and the neighbourhood of Calcutta, while *R. unicornis* is only known from the hilly country to the north, bordering upon Nepal, Bhotan, and Assam. On the other hand, judging from the figures, nearly all the living examples of rhinoceroses brought to this country before the present specimen of *R. sondaicus*, which was acquired by the Society in 1874, have belonged to the species which we call *R. unicornis*; but this is a subject which has been discussed in Mr. Sclater's article on the species of *Rhinoceros* living in the Society's Gardens, shortly to be published in our 'Transactions' with magnificent illustrations of external characters of five species drawn from life.

To return to the collection of skulls. Judged by the tests above given, and by other characters more difficult to describe, but easily appreciated on an examination of the specimens, the one described

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of the Discovery at Sarawak, in Borneo, of the fossilized Teeth of Rhinoceros." In one of the specimens of *R. unicornis* in the British Museum, though the crochet and crista are well developed, there is no actual union of their extremities.

[*] *Loc. cit.*

and figured by Dr. Gray in the paper above referred to as *R. floweri*, and called in the Catalogue of the Museum of the College of Surgeons *R. sumatranus*, is a very characteristic specimen of *R. sondaicus*, belonging perhaps to what Blyth would call the narrow type of that species. It was presented by Sir Stamford Raffles together with the Sumatran specimens, though no locality is recorded for this individual. This circumstance probably occasioned its being entered in the Catalogue as *R. sumatranus*; for although it is not certain that it came from Sumatra, it is quite probable, as we have now other reasons for believing that *R. sondaicus* is an inhabitant of that great island. The two skulls in the British Museum (supposed to be from Borneo) described by Dr. Gray as *R. nasalis* also present, in my opinion, no characters by which they can be distinguished from *R. sondaicus*, while on the other hand his *R. stenocephalus* is a young example of *R. unicornis*, or at all events has all the essential characters of that species as distinguished from *R. sondaicus*. The specific distinctions relied upon by Dr. Gray, the narrowness and rounding of the upper surface of the skull, appear to me far too liable to individual variation to constitute valid characters without other evidence [*].

A skeleton, lately received at the British Museum, through Mr. Franks, of Amsterdam, from Sumatra, is *R. sondaicus*, thus affording confirmatory evidence to that already obtained [†] of the presence of both the two-horned and one-horned species in that island.

A still more interesting circumstance, as enlarging our knowledge of the geographical distribution of these animals, is, that the young skull obtained from Borneo by Mr. Low, of Labuan, added last year to the British-Museum collection, and of the habitat of which there is not a shadow of uncertainty, as in the case of the other supposed Bornean skulls in the same collection (which are *R. sondaicus*), belongs to the two-horned species or *R. sumatrensis*. This fact, with that lately recorded by Mr. Sclater [‡], of the occurrence of this form in Assam, give the two extremes at present known of its range.

A question has lately arisen whether there may not be two species of Asiatic two-horned rhinoceroses. Cuvier already believed that there were two varieties in the island of Sumatra, distinguished by their size; but the question has been brought into prominence by the presence in our gardens of two living animals of the same sex, one from Chittagong, and one from the southern part of the Malay peninsula, presenting such differences of size, colour, length of tail, and distribution of hair, that they would strike any zoologist as being examples, if not of different species, at least of very well marked varieties. In the former light they have been regarded by Mr. Sclater, who has bestowed the name of *R. lasiotis*, or Hairy-eared

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[*] Mr. Busk (P. Z. S. 1869, p. 413, foot-note) has already recorded his opinion that all these three species of Dr. Gray are indistinguishable from *R. sondaicus*. As regards the first two, as will be seen above, I am of the same opinion, but not as regards the third.

[†] The teeth brought by Mr. Wallace and described by Mr. Busk, and the probability of the skull presented to the College of Surgeons by Sir T. Raffles being from that island.

[‡] P. Z. S. 1875, p. 566.

Rhinoceros, on the larger and lighter-coloured individual, retaining the name of *R. sumatrensis* for the smaller one, of which we have recently received a second example.

This determination has been called in question by Dr. Gray; and there are certainly some difficulties in deciding which of the two is the original *R. sumatrensis* of Cuvier (R. A. 1817), founded on Bell's description and figure in the 'Philosophical Transactions' for 1793, as that animal, if correctly drawn, must have been in some respects intermediate between our two living forms. On the whole, however, I am most inclined to think that the small and dark species (Dr. Gray's *Ceratorhinus niger*) is the nearest to Bell's Sumatran Rhinoceros, which is the view taken by Mr. Sclater. There is a skull in the Museum of the College of Surgeons (No. 2936), presented by Sir Joseph Banks, which is stated in the first edition of the Osteological Catalogue (1831) to have been the original of that figured by Bell in the 'Philosophical Transactions.' If this could be proved to be the case, it would satisfactorily determine the cranial characters of the true *R. sumatrensis*; but the discrepancies between the figure and the skull are so great* that, with every allowance for inaccuracy on the artist's part, it is impossible to believe that they could be intended for the same; and, indeed, the author of the second Catalogue (1853) appears to have come to this conclusion, as the reference to the Phil. Trans. is omitted in the description of the specimen. It is, however, extremely probable that the skull in question may have been sent to Sir J. Banks by Bell, as the latter had more than one specimen and was in communication with Sir Joseph, who presented his memoir to the Royal Society; and therefore it may fairly be regarded as a representative of the same species.

As long as the type of Sclater's *R. lasiotis* lives, the important question as to whether any osteological or dental characters are connected with the differences of external appearance cannot be determined; and as my present purpose is only with such characters, I must leave it out of consideration, and return to the eight skulls, four in the College of Surgeons, and four in the British Museum, that are available for examination.

Of those in the first-named collection, three are probably from Sumatra, having been presented by Sir Stamford Raffles; and the other is the one just mentioned, given by Sir Joseph Banks, probably also from Sumatra.

Of those in the British Museum, the locality of one is not recorded; one is from Pegu, having been purchased from Mr. Theobald; one is from Borneo, as previously mentioned; and the last is from the small dark-coloured animal, from Malacca, which died in the Society's Gardens in 1872, an aged female †. This differs from all the others in having no lower incisor teeth. Unless, as is probable, this is an individual peculiarity due to age, it is an important character. A specimen in the Brussels Museum is in an exactly similar condition.

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* Chiefly as regards age, as shown by the teeth, and not differences of any specific value.

† See Mr. Garrod's notes on its anatomy, P. Z. S. 1873, p. 92, where the remarkable difference between the structure of the mucous membrane of the intestine and that of *R. unicornis* is described. It is interesting to note

On comparing these skulls, can any character be found to indicate that they belong to more than one species? Of seven of them I have little hesitation in saying that the differences of proportion and general configuration which occur among them may well be considered within the limits of individual variation; but of one, that from Pegu, in the British Museum, No. 1461 *a*, I am doubtful. There are differences in the conformation of the base of the skull, and in the greater length and more compressed form of the postglenoid process, which separate it from the others; but without further evidence of correlated differences in other parts of the organization, or without further specimens showing the same characters, I should not feel justified in considering these differences specific, knowing that the development of processes for the attachment of muscles are among the most variable of characters. I merely indicate them to direct the attention of any one who may have an opportunity of examining the skull of *R. lasiotis*, or of any fresh examples brought to this country, to compare them with this specimen, especially as Pegu is the most northern locality (and therefore nearest to Chittagong) of any of the skulls of this form of Rhinoceros. The three Sumatran specimens from Sir Stamford Raffles all differ somewhat in size and form; but, allowing for age, the Malacca specimen at the British Museum (*R. niger*, Gray) does not appear to differ materially from them.

Of African rhinoceroses, the British Museum possesses a fine series of eleven skulls, and the College of Surgeons five.

The two distinct types, exemplified by *R. simus*, Burchell, and *R. bicornis*, Linn., are recognizable at a glance. The larger size of the former, together with the depressed, spatulated form of the front end of the mandible, distinguish it at once. It is worthy of note that though the front of the jaws, especially the mandible, of the latter, are so much more reduced and narrow, the incisor teeth are better developed and more persistent. In a young *R. bicornis*, from Abyssinia, in which all the milk-molars are in place and worn, there are rudimentary incisors ($\frac{1}{1}$) in both jaws *; but in two specimens of *R. simus* of younger age, in which the milk-molars are quite unworn, and the last still concealed in its alveolus, there is no trace of incisors; so that, as far as this character is concerned, *R. simus* is

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that precisely the same circumstance was recorded, though very briefly, in a description of the viscera of a rhinoceros sent from Sumatra by Sir S. Raffles, of which Sir E. Home says (Philosophical Transactions, 1821, part i. p. 271), "the small intestines measured fifty-four feet six inches; the valvulæ conniventes are continued nearly through the whole extent, and in general circular, although not all so."

* In a specimen in the Museum of the College of Surgeons, figured in Owen's 'Odontography,' there are two incisors on each side in the mandible; and these sometimes persist to adult age, as shown by Dr. Gray, P. Z. S. 1869, p. 225. This distinction between *R. simus* and *R. bicornis* was also noticed by Duvernoy in the young specimens in the Paris Museum.

the most specialized of all the living Rhinoceroses. The broad form of the front of the lower jaw, as compared with *R. bicornis*, is quite well seen in these very young specimens.

With regard to the molar teeth, the same kind of difference occurs between these forms as between the two Indian one-horned species. The larger one has a greater complexity of arrangement, derived from the more frequent union of crochet and crista, cutting off an accessory valley. But it must be noticed that there is an extraordinary variation in this respect between two examples of *R. simus* of nearly the same age in the British Museum, so great, indeed, that, if supported by other characters, they might be taken to indicate specific distinctness. In fact they either do this or show that the precise pattern of the enamel-folds of the molar teeth, so much relied upon by palæontologists to distinguish species, is a rather uncertain character. In one of these skulls (No. 1003*a*) the crochet and crista are united in all the premolar and molar teeth of both sides. In the other (No. 1003 *b*), an older specimen, and somewhat smaller, though presenting all the general characters of the species, they are united only in the left second premolar, in both third premolars, in both first molars and in the right third molar. The want of symmetry throws some doubt upon the value of this character *; otherwise it might, combined with the smaller size and narrower nasals of this specimen (perhaps only sexual differences?), lend some countenance to the common belief among African sportsmen and travellers, that there is a second large species allied to *R. simus*.

In the smaller African rhinoceros, *R. bicornis*, the crochet and crista of the molar teeth are both well developed, but rarely united in the true molars, though frequently so in the premolars. Whether there is one or more species of this form, has long been debated by zoologists; but those who have given their verdict for two have founded their decision solely on external characters, chiefly the form and size of the posterior horn, and no attempt has ever been made to show whether any osteological or dental characters were correlated with these. In fact, until very recently there were no materials accessible for the investigation. The acquisition by the British Museum of two complete skeletons of the reputed *R. keitloa*, and others of *R. bicornis*, with the horns attached, has, however, rendered the investigation a practicable one. I have not yet had the leisure to make the careful examination of the whole skeleton which would be desirable; but, comparing the skulls and teeth of perfectly adult individuals presenting both varieties of horns, I have not been able to detect any differences either of size, general proportions, or relations of the various bones to each other, that could reasonably be called specific. All that can be inferred from this is, that I have not at present seen any thing derived from osteological or dental structures to confirm the belief in the existence of more than one species of the smaller type of African rhinoceros. Other observers may, with more ample materials, be more fortunate; and I am by no means disposed to underrate the testimony of many experienced field-naturalists on this subject. Such osteological evidence as we have upon the question, if applied to the genus *Equus*, would probably fail to distinguish the three well-recognized South-African species of Zebras.

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* And its variability as before noted, in specimens of undoubted *R. unicornis*.

The results derived from the examination of these fifty-four skulls of *Rhinoceros* may be thus tabulated:—

A. The adults with a single large compressed incisor above on each side, and occasionally a small lateral one; below, a very small median, and a very large, procumbent, pointed lateral incisor. The post-glenoid and post-tympanic processes of the squamosal united below the external meatus auditorius. The posterior occipital surface sloping from below upwards and forwards, the crest being anterior in position to the condyles. Nasal bones pointed in front. A single nasal horn. Skin very thick, raised into strong, definitely arranged ridges or folds. RHINOCEROS, Linn.

a. Larger size. Upper molar teeth with crochet and crista generally united, cutting off an "accessory" valley from the median sinus. Posterior end of vomer thickened and adherent. Mesopterygoid fossa and basi-occipital narrow. Hinder margin of palate regularly concave. Occipital surface high and narrow. Ramus of mandible high.

1. R. UNICORNIS, Linn.*
   R. indicus, Cuv. (R. A. 1817).
   R. stenocephalus, Gray (P. Z. S. 1867).

b. Smaller size. Upper molar teeth without crista. Posterior end of vomer thin and free. Mesopterygoid fossa and basi-occipital broad. Hinder margin of the palate produced in the middle. Occipital surface broad and low. Ramus of mandible low †.

2. R. SONDAICUS, Cuv. (in Desm. Mamm. 1822).
   R. javanicus, F. Cuv. & Geoffr. (Mammifères, 1824).
   R. floweri, Gray (P. Z. S. 1867).
   R. nasalis, Gray (P. Z. S. 1867).

B. The adults with a single moderate-sized compressed incisor above, and a single, laterally placed, pointed, procumbent incisor below, which is sometimes lost in old animals. The post-glenoid and post-tympanic processes of the squamosal not meeting below the meatus auditorius. Occipital crest produced backwards so as to overhang the occipital surface of the skull. Nasal bones narrow and pointed anteriorly. A well-developed nasal and a small frontal horn separated by an interval. The skin thrown into folds, but not so strongly marked as in A. Ceratorhinus, Gray, P. Z. S. (1867) *.

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* Cuvier's names for this and the common African species are often preferred on the following grounds:—"The names of *R. unicornis* and *bicornis*, Linn., can be no longer retained, since more than one species is known, both of those with one and of those with two horns" (Van der Hoeven's Handbook of Zoology). But as a precisely similar objection can be raised against the names *indicus* and *africanus*, nothing is gained by the change.

† The differences in external appearance, and especially in the skin-folds, between *R. unicornis* and *R. sondaicus* are well seen in the figure published in the Society's 'Proceedings,' 1874, pl. xxviii.; also in two sketches in 'Nature,' April 9th, 1874, from the animals living in the Society's menagerie.

1. C. sumatrensis, Cuv. (R. A. 1817).

C. sumatranus, Raffles (Trans. Linn. Soc. vol. xiii. 1822, p. 268).
C. niger, Gray (Hand-list Edentates &c. Brit. Mus. p. 48, 1873).

2. C. lasiotis, Sclater (P. Z. S. 1872, p. 493).

(Anatomical characters unknown.)

C. In the adults the incisors are either quite rudimentary or entirely wanting. The post-tympanic and post-glenoid processes not united below the auditory meatus. Occipital crest produced backwards, and overhanging the occipital surface of the skull and condyles. Nasal bones thickened and rounded or truncated in front. An anterior and posterior horn in close contact. Skin without any definite permanent folds. Atelodus, Pomel (1853) †.

a. Smaller size. Incisor teeth always present in the young, and sometimes persistent as rudiments through life. Molar teeth with crista and crochet rarely united. Front end of mandible deep and compressed.

1. A. bicornis, Linn.

R. africanus, Cuv. (R. A. 1817).
R. keitloa, A. Smith (Cat. S. A. Mus. p. 7, 1837).

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* These terms may be taken either as generic, or as indicating natural sections of the Linnean genus *Rhinoceros*. The great differences in the visceral anatomy (referred to above) between this species and the first, tend to support the former view. Their significance will, however, be better understood, when the internal anatomy of the third section is known, and also that of *R. sondaicus*.

† Pomel divided the genus *Rhinoceros*, Linn., into three subgenera :—

1. *Acerotherium*, Kaup.
2. *Rhinoceros*, Linn.
3. *Atelodus*, Pomel.

The last is thus defined. "Os nasaux portant une ou deux cornes ; pied à trois doigts. Une ou deux paires d'incisives inférieures caduques en forme de simple tubercule souvent à peine sorti de la gencive, ou nulles ; pas de plis à la peau sur les espèces vivantes."

The following are the species assigned to this group :—

A. elatus (Croizet & Jobert)	extinct.
A. leptorhinus (Cuv.)	
A. tichorhinus (Cuv.)	
A. aymardi (Pomel)	
A. bicornis (L.)	existing.
A. keitloa (A. Smith)	
A. simus (Burchell)	

("Catalogue méthodique et descriptif des vertèbres fossiles découverts dans le bassin hydrographique supérieur de la Loire," Part ii., in 'Annales scientifiques, littéraires et industrielles de l'Auvergne,' tom. xxvi. 1853, p. 114.)

b. Larger size. Incisor teeth, if ever present, disappearing very soon after birth. Molar teeth with crista and crochet generally united. Front end of mandible depressed and spatulate.

2. A. SIMUS, Burchell (Bull. Soc. Philomat. p. 96, 1817).

A. oswellii, Gray (P. Z. S. 1853, p. 46).

In reference to the name of this group, *Cœlodonta* (Bronn, Jahrbuch für Mineralogie, 1831, p. 51) was proposed for some teeth supposed to belong to a new genus allied to Rhinoceros, but subsequently identified as those of the well-known *R. tichorhinus*, Cuv.* It can scarcely be retained, however, for the group now under consideration, as its definition would include *R. unicornis*, and exclude many of the species without incisor teeth. It was, in fact, never equivalent to Pomel's *Atelodus*, though it might be used (as by Dr. Gray, *loc. cit.* 1867) by any one who thinks fit to separate *R. tichorhinus* generically from all the other members of the family. In the Catalogue of the bones of Mammalia in the British Museum (1862), Dr. Gray uses *Rhinaster* for all the species of existing African rhinoceroses; but in the memoir so often referred to above (1867) this name is limited to *R. bicornis* and *R. keitloa*, and *Ceratotherium* is introduced for *R. simus*. *Rhinaster*, as applied to the Rhinocerotidæ, appears to be later than *Atelodus*. It was, moreover, proposed by Wagler (Syst. Amphib. 1830) as a substitute for Illiger's genus *Condylura* (Insectivora), on account of the latter being inappropriate; but it has not been generally adopted. As the termination of such a term as *Ceratotherium*, by common consent of zoologists, has hitherto been restricted to extinct genera, its application to *R. simus* is inconvenient. Fortunately, in the grouping proposed above, the name is unnecessary, as the members of the family with the incisor teeth small or absent form a well-characterized, even if somewhat artificial, generic group, which scarcely needs further subdivision.

Although most of the known extinct species of *Rhinoceros* may be arranged under one or the other of the above sections, the definitions would have, as, indeed, might be expected, to be considerably modified to include them. Thus *R. schleiermacheri*, Kaup, of the late European Miocenes, though allied to *R. sumatrensis* in possessing incisor teeth and two horns, and so far coming under the definition of *Ceratorhinus*, retains the central lower incisors of *Rhinoceros* proper, and has the post-glenoid and post-tympanic processes united, as, indeed, have all the extinct forms that I have examined. On the supposition that this species is the direct ancestor or representative of the *Ceratorhinus* group of modern times, the presence of the four inferior incisors, as a more generalized character, is quite natural; but the structure of the squamosal is not so easy to understand, as being more specialized than in the modern species. Precisely the same occurs with the former representatives of the *Atelodus* group, of which the Miocene *R. pachygnathus*, Wagner, from Pikermi, is the earliest known form, and the four extinct British species, *R. etruscus*, Falc., *R. leptorhinus*, Cuv., *R. hemitœchus*, Falc., and *R. tichorhinus*, Cuv., are more or less modified members. The recently discovered *R. deccanensis*, Foote, from South India, appears to belong to it also. The several species found in the Siwalik beds and other parts of South Asia appear to have belonged to the genus *Rhinoceros* as restricted above, with large incisors and one horn.

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* *R. antiquitatis*, Blum., is the earliest name for this species, and is adopted by Brandt and Dr. Falconer, though Cuvier's name still holds its ground with most authors.

To include all the extinct members of the family at present known; the genus *Aceratherium*, Kaup, must be added for the species with no horn, large incisors, and four toes on the fore feet, *Diceratherium*, Marsh, for species with indications of a pair of lateral horns on the nasals, and *Hyracodon*, Leidy, for primitive forms without horns and retaining the complete number of forty-four incisor, canine, and molar teeth, the latter of comparatively simple structure without crochet or crista. When we extend our search for Rhinocerotidæ beyond the Miocene period, we find that they cease to be recognizable as such, and become merged into more generalized perissodactyle forms.

4. Further Notes on *Oulodon*, a new Genus of Ziphioid Whales from the New-Zealand Seas. By Julius von Haast, Ph.D., F.R.S., Director of the Canterbury Museum, Christchurch, New Zealand.

[Received May 1, 1876.]

It will be seen from the following notes that the presence of a row of small teeth in the upper jaw is a constant character in my *Mesoplodon grayi* (P. Z. S. 1876, p. 7); and unless it shall be shown by future researches that other species belonging to the genus *Mesoplodon* have similar rows of small teeth and of a permanent character in the upper jaw, I think that the generic term *Oulodon* ought to be applied to the Ziphioid Whales distinguished by that peculiar feature, which, so far as I am aware, no others of the group possess.

Since I had the pleasure to lay the description of the three skulls obtained on the Chatham Islands before the Society, four specimens belonging to the same Ziphioid, which with our local fishermen goes under the name of Cowfish, have been stranded on the coast near Saltwater Creek, about 30 miles north of Banks Peninsula. One of them, a small male (A) about 13 feet long, was washed ashore on the 15th of December, 1875. On the 29th of December another male (B), 12 feet 9 inches long, was stranded, together with a female (D), 17 feet 6 inches long, on the beach a short distance north of the entrance of the Saltwater-Creek Estuary; whilst another male (C), 13 feet 8 inches long, ran the same day into that small estuary, and was left high and dry by the receding tide.

As I was fortunate enough to obtain two of these skeletons complete, I shall be able to send one of them to my friend Prof. W. H. Flower as a type specimen, and for description; and I therefore leave the osteological details to him. Although the bones are not yet quite macerated, I may state that the female, exceeding by nearly 4 feet the largest male obtained, is a full-grown animal, whilst the three males are all immature specimens. I measured the length of its lower jaw, and find that it is 2 feet 8·50 inches long, consequently nearly 1 inch longer than the lower jaw of the dried skull which I assigned to a full-grown female, and to which it bears a close resemblance. The mandibular tooth could scarcely be felt when passing the finger over the gums of this specimen; and its existence could scarcely have been ascertained in that way had I not known its exact position.

On the other hand, in all the three male skulls the point of the mandibular tooth protruded already, even in the smallest, through the gums, and the more laterally extended size of that portion of the lower jaw was at once discernible. I measured also the lower jaw of the male skull (B), and found it to be 1 foot 11·85 inches long; consequently its size is intermediate between the two Chatham-Island skulls no. ii., of which the lower jaw measures 2 feet 6·03 inches, and of the immature no. iii., which is only 1 foot 7·75 inches long.

All the four skulls possess from seventeen to nineteen teeth on both sides of the roof of the mouth; so that this character can now be claimed as being constant and specific.

As to the external features of this species, its form may be described as being rather elegant; the head is tapering; and the beak-like rostrum runs out to a point, so that it was not inappropriately compared by one of the workmen to the beak of a bird.

The colour of the back is black, getting a little lighter near the tail, where it assumes a dark slate tint; the lower side is reddish brown, near the tail assuming on both sides a more blackish hue.

The blowhole is situated in the centre; it is about 6 inches in diameter, and the corners are directed forward. The animal possesses a large falcate dorsal fin, situated rather backwards; and the pectoral fins are small and somewhat pointed.

The following measurements were taken from the immature male (C):—Total length 13 feet 8 inches; girth round body 18 inches behind pectoral fins, where the animal has its largest size, 9 feet; from point of rostrum to anterior border of pectoral fin, 3 feet 5 inches; from posterior end of dorsal fin to centre of tail-lobes, 4 feet 3 inches.

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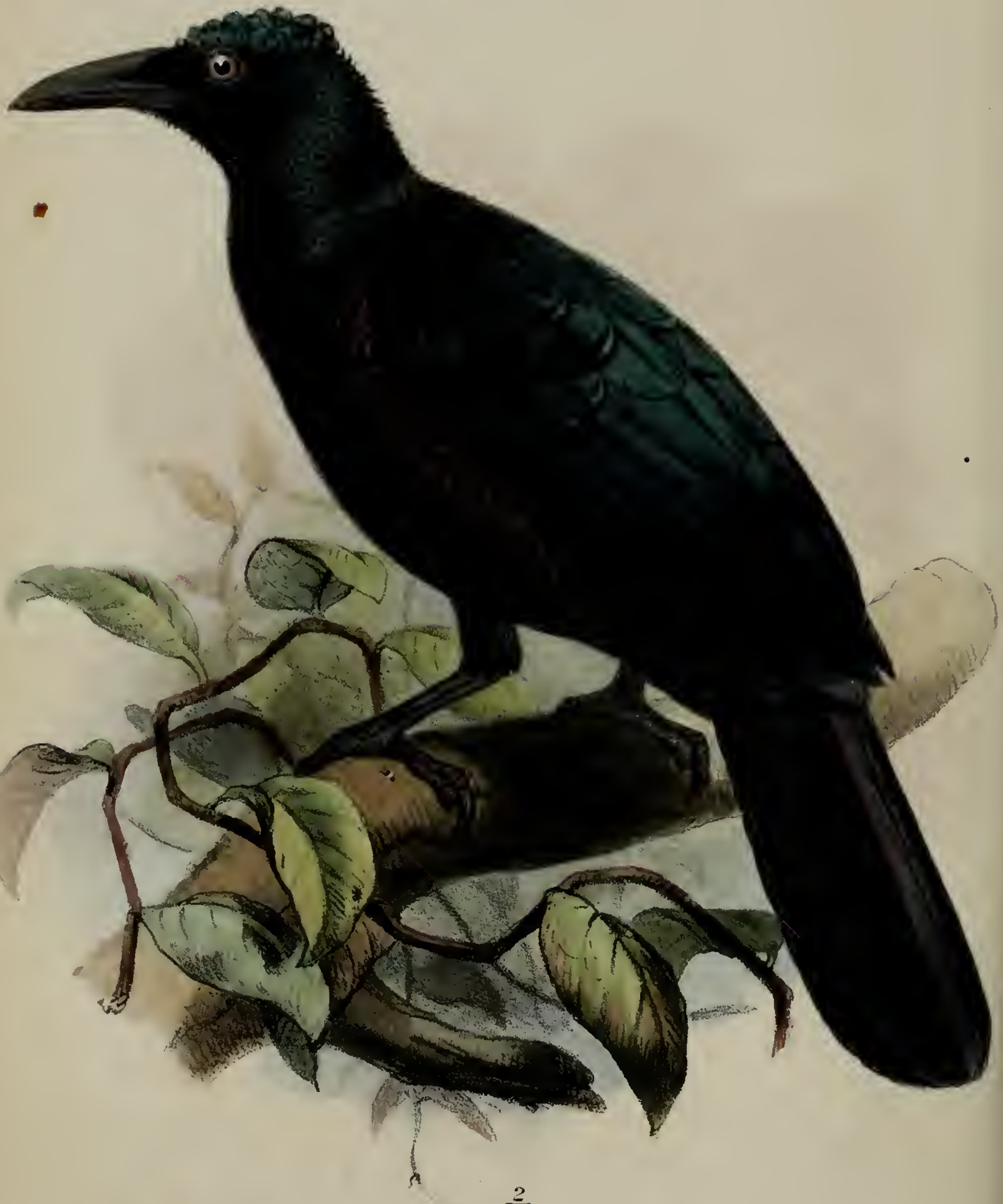
P Z S 1876 Pl XLII



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MANUCODIA COMRII

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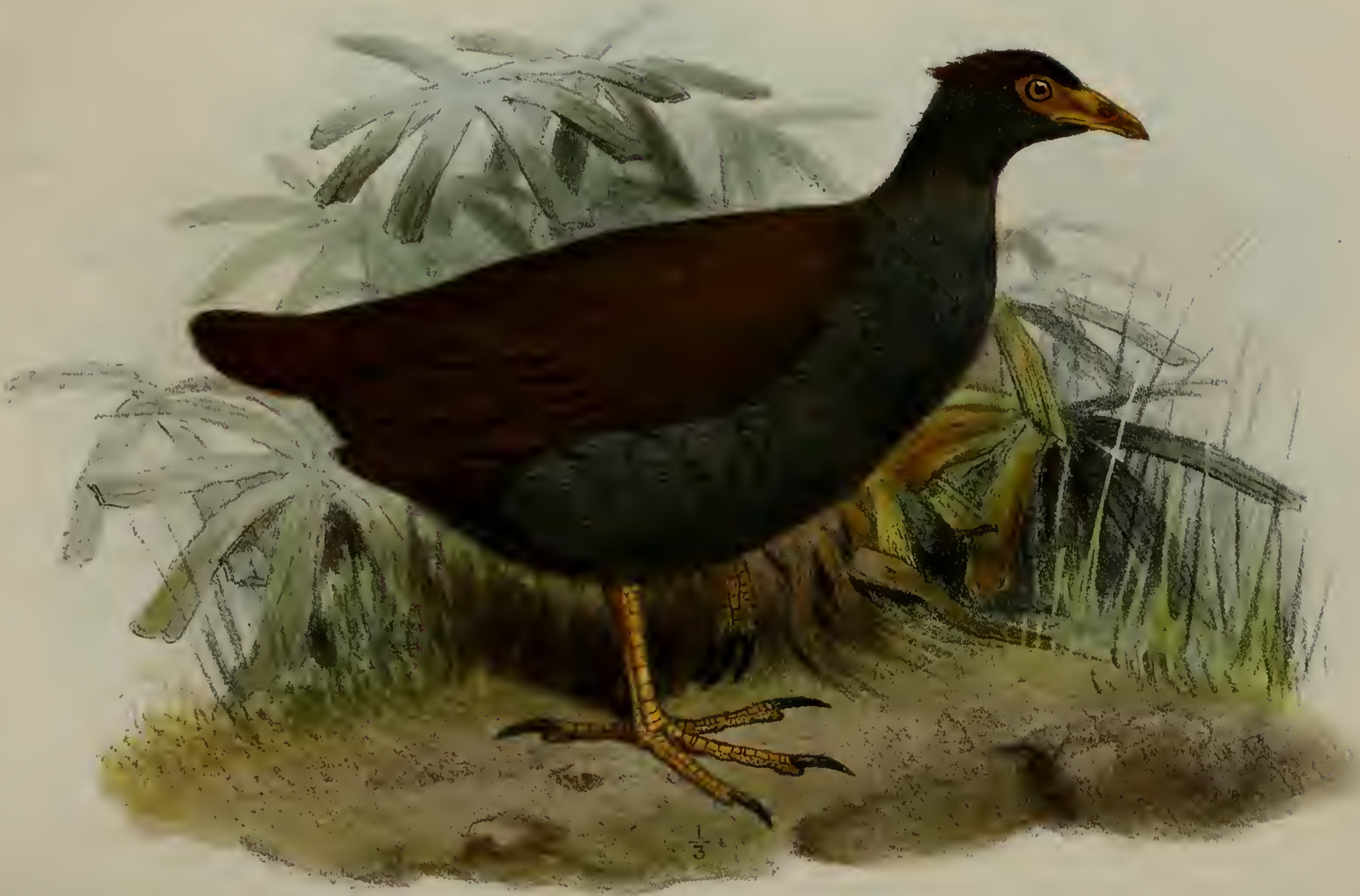
P. Z. S. 1876 Pl. XLIII



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MEGAPODIUS MACGILLIVRAYII

5. On the Birds collected by Dr. Comrie on the South-east Coast of New Guinea during the Survey of H.M.S. 'Basilisk.' By P. L. Sclater, M.A., F.R.S., Secretary to the Society.

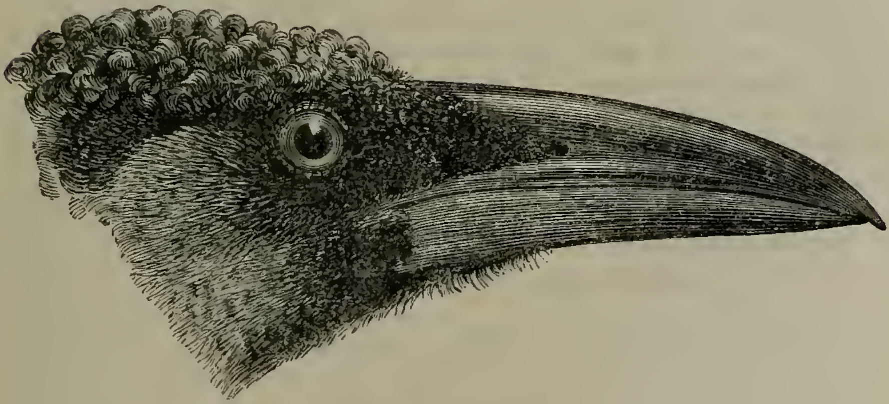
[Received May 15, 1876.]

(Plates XLII. & XLIII.)

Dr. Comrie has placed in my hands for determination some bird-skins collected by him while serving as medical officer in H.M.S. 'Basilisk,' during its recent survey of the south-east coast of New Guinea under the command of Capt. Moresby*. The collection contains thirteen skins, belonging to eleven species, of which one is quite new to science, and two others are only known from single specimens. Their names are as follows:—

1. Corvus orru, Bp.

One example from Huon Gulf, south-east coast of New Guinea, nearly opposite New Britain.



Head of *Manucodia comrii.*

2. Manucodia comrii, sp. nov. (Plate XLII.)

Nitidissime sericeo-æneo-viridis, fere unicolor, in ventre purpurascens: capitis cervicisque undique plumis revolutis quasi cincinnatis: alis caudaque intus nigris, extus dorso concoloribus, paulo in purpureum trahentibus: rostro elongato, ad nares sulcato, nigro: pedibus nigris: long. tota 17·0, *alæ* 9·5, *caudæ* 7·0, *rostri a rictu* 2·2, *tarsi* 1·7.

Hab. Papuæ reg. meridionali-orientalis, Huan-Gulf (*Comrie*).

This is by far the finest and largest of the peculiar genus now generally termed *Manucodia* (formerly *Phonygama*) yet discovered. It is immediately distinguishable from *M. chalybeia* and *M. atra* by its much larger size and longer bill, which is deeply sulcated at the nostrils. The characteristic curling of the feathers is extended to a greater degree than in *M. chalybeia*, and pervades the whole of the head and neck. The feathers of the abdomen are black at the base, broadly margined with purple.

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* See Capt. Moresby's narrative in his 'Discoveries and Surveys in New Guinea and the D'Entrecastreux Islands.' London: 1876. 1 vol. 8vo.

Dr. Comrie obtained a single specimen of this fine bird in May 1874 in Huan Gulf. It was shot flying amongst the trees in the scrubby forest about a quarter of a mile from the coast.

3. DACELO GAUDICHAUDI, Quoy et Gaim.

Huon Gulf, one skin.

4. LORIUS HYPŒNOCHROUS.

Lorius hypoinochrous, Gray, List of Psitt. p. 49 (1859); Brenchley's Voy. p. 380, pl. 14.

Domicella hypoinochroa, Finsch, Papag. ii. p. 768.

Three skins of this fine Lory were obtained by Dr. Comrie in Possession Bay*, S.E. New Guinea, in April and May 1874. On comparing them with the typical specimen in the British Museum, which was obtained by Macgillivray during the voyage of the 'Rattlesnake' on one of the islands of the Louisiade group, off the S.E. coast of New Guinea, I find that they differ in the absence of the slight black band across the under wing-coverts, which is found in the typical specimen. There is likewise rather more blue on the abdomen of Dr. Comrie's skins. These differences are, in my opinion, too slight to warrant specific separation.

5. CARPOPHAGA PINON (Quoy et Gaim.); Bp. Consp. ii. p. 37.

6. CARPOPHAGA SPILORRHOA, G. R. Gray.

One skin from South-east Cape, New Guinea.

7. CALŒNAS NICOBARICA (Linn.).

One skin, obtained in Huan Gulf in April.

8. MEGAPODIUS MACGILLIVRAII. (Plate XLIII.)

Megapodius macgillivrayi, G. R. Gray, P. Z. S. 1861, p. 289, & 1864, p. 43.

A single skin of this little-known Megapode, obtained by Dr. Comrie on the shores of Huan Gulf in May, agrees tolerably well with the typical specimen of the species in the British Museum. The chief difference remarkable is in the more rufescent tinge of the lower back of the present specimen, which may be shortly described as follows:—

Supra fuscescenti-olivaceus, dorso postico rufescentiore: subtus saturate cinereus, hypochondriis et crisso olivaceis: rostro et

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* Possession Bay will be found marked in Capt. Moresby's map, p. 1; see also the text, p. 208. It seems to lie between Hayter Island and the opposite south-eastern point of the mainland of New Guinea.

pedibus flavis, unguibus nigris : long. tota circ. 13·0, *alæ* 8·7, *caudæ* 3·2, *tarsi* 2·6.

The figure is taken from Dr. Comrie's skin.

9. ESACUS MAGNIROSTRIS (Geoffr.); Gould, B. of Austr. vol. vii. pl. 6.

One example from Huan Gulf.

10. STERNA MELANAUCHEN (Temm.).

One skin, obtained in the D'Entrecasteaux Islands in March, is referable to this species, as Mr. Howard Saunders kindly assures me. Mr. Gould has already recorded its occurrence in Torres Straits (B. Austr. vii. pl. 28), where it was obtained by MacGillivray.

11. PHALACROCORAX, sp. inc.

A single skin of a young Cormorant, in nearly uniform brown plumage with yellow feet, obtained in Huan Gulf in May.

6. Additional Notes on *Dolichotis salinicola*. By HERMANN BURMEISTER, Director of the National Museum, Buenos Aires, F.M.Z.S.

[Received May 4, 1876.]

Since my former description of this new species of *Dolichotis* *, I have been fortunate enough to have two fully adult living specimens sent to me for examination by a gentlemen who has had them alive in his house at Santiago del Estero. This gentleman informed me that this species is common in the country to the west of that town, its range beginning in the south near the small town of Chanar, and extending northwards along the borders of the great salina desert as far as Santiago del Estero and the river Dulce, where the country has the same sterile character, but not into the much more fertile region of the Province of Tucuman more to the north. Especially in the vicinity of Posta del monte and of the village of Piedritas near Chanar the animal is very common. The two living specimens, which are now under my inspection, show that my former description was taken from very young specimens of about half their full size, and that this northern species comes much nearer in size to the southern species (*D. patagonica*) than I was formerly led to suppose.

A fully adult specimen agrees very closely in size and colour with the Patagonian species, only differing slightly in some shades of colour and in shape. The head is somewhat shorter and stouter, more especially the anterior portion from the nose to the eyes (which was already indicated in the skull of the young animal), although the space between the nasals and the intermaxillaries is much longer, this space equalling half the length of the nasals in the northern species, and not more than one third in the southern;

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* See P. Z. S. 1875, p. 634.

also the legs are somewhat shorter in the northern species, and the body is broader behind. There is considerable difference in the coloration between the young and adult. As is shown by my figure and description of the former, the reddish-yellow tint is mixed with the grey over the whole upper surface, leaving the underside white, separated at the sides from the more homogeneous reddish grey colour of the upper surface. In the adult these three colours are more completely separated from each other, only the middle of the back being grey, the sides of the body yellow, and the underside white. This separation, already indicated on the head of the young animal, is continued as it becomes older over the whole body, as is also the case in the Patagonian species, which shows the grey on the front of the body gradually getting darker towards the rump, where it is nearly black. This black shade very well marks the specific difference between the two species; for in the northern (*D. salinicola*) the grey colour is more clear and of a more pure whitish-grey; but in the southern species (*D. patagonica*) the tint is somewhat yellower, resembling more an ash-grey. From the middle of the back this colour becomes darker in both species, till it forms over the region of the pelvis a large dark patch, the posterior edge of which is sharply defined from the white of the lower parts in a transverse line, which crosses the rudimentary tail, and extends to the haunches, where the white and yellow colours are shaded into each other. This patch affords a good diagnostic character for the separation of the species, its colour in the Patagonian species being blackish brown and in the northern species blackish-grey; for in the latter there are a number of white punctuations which are totally wanting in the former. In all other respects the colour is the same; so that many observers would believe the new species to be only a variety of the other species, if they were not aware of the differences in the skulls already pointed out in my former description.

I regret not being able to give any further particulars as regards the skull and skeleton of this *Dolichotis*, as I was not allowed to kill one of the specimens; but as soon as one of them dies I will send to the Society a full description of it.

Buenos Aires, 28th March, 1876.

June 6, 1876.

Dr. A. Günther, F.R.S., V.P., in the Chair.

The following report on the additions to the Society's Menagerie during the month of May 1876 was read by the Secretary:—

The total number of registered additions to the Society's Menagerie during the month of May 1876 was 99, of which 23 were by birth, 33 were by presentation, 28 by purchase, 4 by exchange, and 11 were received on deposit. The total number of departures during the same period by death and removals was 115.

The most noticeable additions during the month were:—

1. A fine specimen of the Tooth-billed Pigeon (*Didunculus strigirostris*), purchased May 9th, being the third example of this rare bird received alive by the Society.

2. An example of the White-backed Trumpeter (*Psophia leucoptera*), presented May 20, by Mr. H. Stacy Marks, A.R.A., F.Z.S. This bird, which has been in the Society's Gardens on deposit since October last, has not been previously exhibited in the Collection.

3. A pair of Curassows (apparently *Crax viridirostris*, mihi, Trans. Zool. Soc. ix. p. 282), from Cartagena, purchased May 31st. Of these birds I shall have something to say in a paper containing additions to my memoir on the Curassows living in the Society's Gardens, which I have in preparation.

4. A mother and three young of the Indian Fawn-coloured Field-mouse, *Mus cervicolor*, Hodgson (Jerdon, Mamm. of India, p. 206), presented by Lieut. Col. C. S. Sturt, C.M.Z.S., and received May 31st. Col. Sturt writes me that he captured the mother, when shooting hares near Rajcote, with the three young ones hanging to her teats. The species is common in Kattiawar, inhabiting the hedgerows and fields.

5. A Blue or Soft-billed Duck (*Hymenolæmus malacorhynchus*), from New Zealand, presented by the Acclimatization Society of Otago, and received May 31st. This bird unfortunately arrived in an exhausted state, and died very shortly. It is the first example of this curious species that has reached us.

I have also to call attention to the collection of Indian animals made by the Prince of Wales during his recent tour in India, which His Royal Highness has been pleased to deposit in our Gardens for exhibition. This collection consists of the following animals:—

I. Mammals.

2 Green Monkeys (*Cercopithecus callitrichus*).
2 Rhesus Monkeys (*Macacus erythræus*).
5 Tigers (*Felis tigris*).
7 Leopards (*Felis pardus*).
1 Cheetah (*Felis jubata*).
1 Viverrine Cat (*Felis viverrina*).
1 Indian Civet (*Viverricula indica*).
4 Tailless Dogs (*Canis familiaris*, var.).
3 Tibetan Mastiffs (*Canis familiaris*, var.).
2 White Dogs (*Canis familiaris*, var.).
2 Indian Wild Dogs (*Canis primævus*).
1 Himalayan Bear (*Ursus tibetanus*).
1 Sloth Bear (*Melursus labiatus*).
4 Indian Elephants (*Elephas indicus*).
6 Domestic Sheep (*Ovis aries*).
2 Thar Goats (*Capra jemlaica*).
4 Shawl-Goats (*Capra hircus*, var.).
8 Indian Antelopes (*Antilope cervicapra*).
2 Zebus (*Bos indicus*).
2 Spotted Porcine Deer (*Cervus minor*).
3 Axis Deer (*Cervus axis*).
2 Musk-Deer (*Moschus moschiferus*).

65

II. Birds.

1 Grey-winged Blackbird (*Turdus pœcilopterus*).
2 Wedge-tailed Pigeons (*Treron sphenura*).
5 Domestic Pigeons (*Columba domestica*, var.).
8 Surat Doves (*Turtur suratensis*).
1 Black Francolin (*Francolinus vulgaris*).
2 Hill Francolins (*Arboricola torqueola*).
4 Chukar Partridges (*Cacabis chukar*).
15 Impeyan Pheasants (*Lophophorus impeyanus*).
21 Cheer Pheasants (*Phasianus wallichii*).
2 Pucras Pheasants (*Pucrasia macrolopha*).
4 White-crested Kaleeges (*Euplocamus albocristatus*).
3 Bankiva Jungle-fowl (*Gallus bankiva*).
10 Horned Tragopans (*Ceriornis satyra*).
5 Indian Peafowl (*Pavo cristatus*).
3 Ostriches (*Struthio camelus*).
86

The whole collection contains 65 specimens of Mammals and 86 of Birds, referable to about 30 species, not including domestic varieties. Of these the most interesting in a scientific point of view are:—

1. A pair of Thar Goats (*Capra jemlaica*), from the higher Himalayan ranges. A male of this fine species of Wild Goat was presented to the Society in 1852, by Capt. Townley Parker, and is correctly figured in Wolf and Sclater's 'Zoological Sketches,' vol. i. pl. 25; but no example of it has been since received.

2. Two examples of the "Khar Laghuna, or Lesser Porcine Deer (*Cervus minor*)" of Hodgson, from the Terai of Nepaul. Of this form of Deer, which appears to be a valid species intermediate between the Axis and the Hog Deer, no previous specimens have reached this country.

3. Two male Musk-deer (*Moschus moschiferus*), from the Himalayas. The Society have previously had but one female of this delicate animal, presented by Sir F. R. Pollock in 1869.

The Secretary exhibited specimens of a Land-crab from Ascension Island, which had been presented to the Society by Dr. S. B. Drew, and read the following remarks upon them by Dr. Drew:—

"The Land-crab, found on the Island of Ascension, belongs, I believe, to the species *Geocarcinus lagostoma*; it inhabits the mountain-ridges, particularly on the weather-side of the island, owing perhaps to the greater amount of moisture found there. They burrow in holes, and are but seldom seen during the heat of the day, except after dawn and on their return-journey from the sea, when they are easily killed. They commit great ravages on the island, destroying the eggs and young of the various kinds of game, besides the vegetation. The following incident came under my own observation:—While out shooting, a very young rabbit, which I wished to capture alive, crossed my path and retreated into a hole in the

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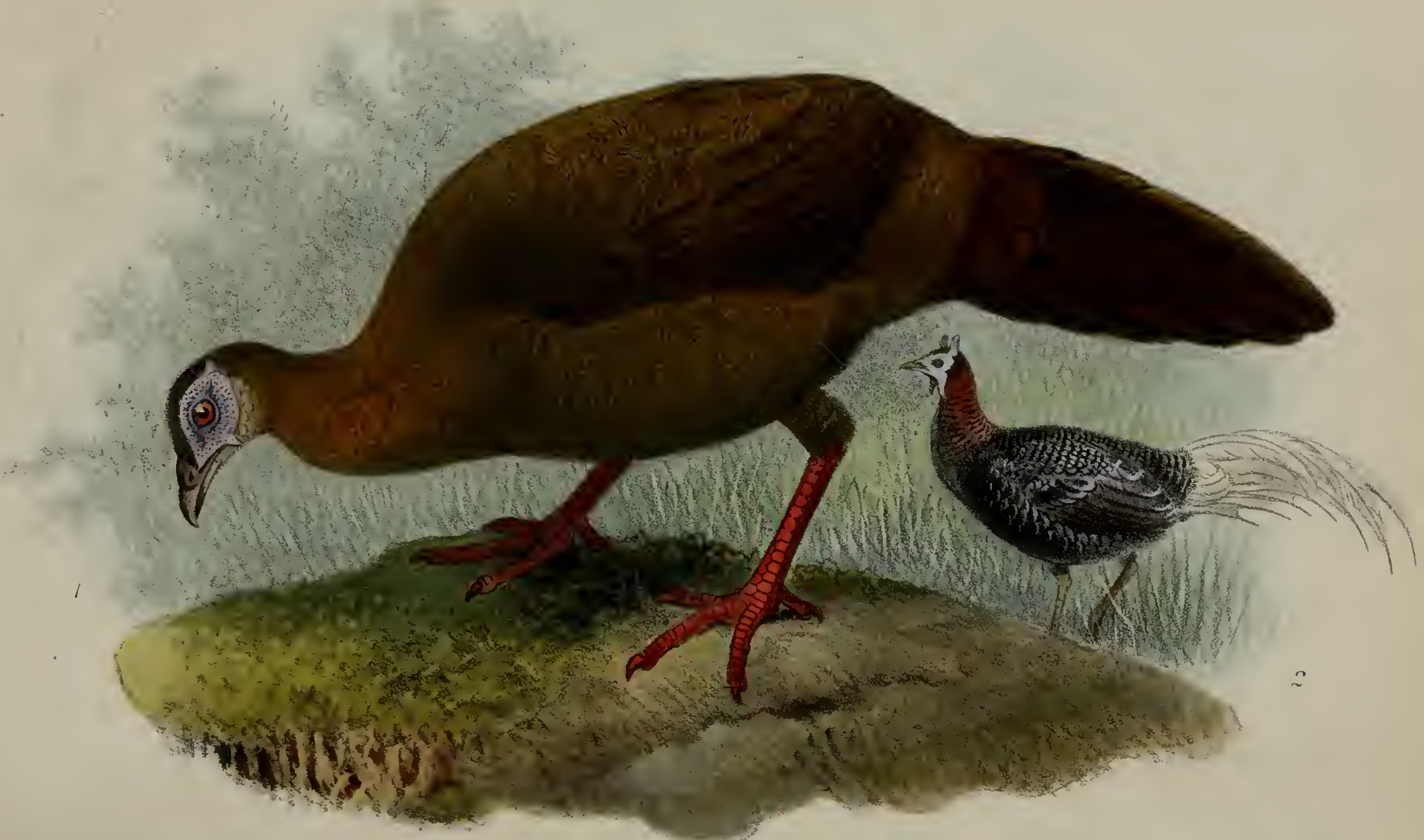
P.Z.S. 1876 Pl. XLIV



J. Smit del. et lith.

M & N. Hanhart imp.

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LOBIOPHASIS BULWERI, 1♀, 2♂

rock; at the bottom of the hole, and away from the reach of my arm, was a Land-crab, which, undismayed by my presence, pounced on the unhappy Rabbit and killed it before I could come to its rescue. The earliest records of the island tend to show that the Land-crabs have always been troublesome, as a reward was and is now given for their destruction. I have only observed them going to the sea during the months of February and March. Their journey to the sea is only made at night or towards evening; on their return they come at all times. I do not know at what season they cast their shells; but I am led to think, from the number of old ones I have seen, that it is soon after their return from the sea. They are but seldom eaten on the island, although when properly cooked they form no mean dish; but they are not of nearly so delicate a flavour as the West-Indian Land-crab."

Mr. Sclater exhibited skins of the male and female of the new Pheasant from Borneo, lately described by Mr. Sharpe (Annals of Nat. Hist. ser. 4, vol. xiv. p. 373) as *Lobiophasis bulweri*, and figured in Part 27 of Gould's 'Birds of Asia.'

A pair of these birds had been procured from Borneo in December last by Mr. Scheepmaker, of Sourabaya, agent to the Royal Zoological Society of Amsterdam. The male bird had died in Java; the female had been forwarded alive to Amsterdam, but had arrived in a weak condition and lived only a few weeks. Mr. Westermann's kindness had enabled Mr. Sclater to exhibit these fine birds, of which the female was previously unknown, and might be described as follows:—

LOBIOPHASIS BULWERI, fem. (Plate XLIV.)

Brunnea, subtus in castaneum vergens, fusco omnino minutissime vermiculata: capite minus rufescente et in gutture valde pallidiore: lateribus capitis totis nudis, in ave viva cærulescentibus, carunculis utrinque duabus minutis, altera ad latus menti, altera ad nucham sitis: remigibus et rectricibus saturate brunneis, unicoloribus: cauda rotundata, e rectricibus ut videtur xxviii. *composita: rostro corneo, pedibus rubris: long. tota* 20, *alæ* 9, *caudæ rectr. ext.* 3·7, *med.* 5·7, *tarsi* 3·5.

Obs. There are slight indications of the tarsal spurs in the female. The tail is not perfect; but there appear to have been at least 28 rectrices (an extraordinary number); and in the skin of the male I make 15 on one side, so that 30 is probably the full complement. Mr. Sharpe does not give the number of tail-feathers in his specimen.

Mr. Garrod, who kindly examined the body of the female, reports the gizzard as strongly muscular; the small intestine 5·4 in., the large 4 ft. 6 in. in length; the cæca 6 in. in length; the oil-gland nude or very slightly tufted.

The sternum, which I exhibit, appears to be very like that of *Euplocamus*.

Mr. Sclater read an extract from a letter addressed to him by Mr. J. H. Gurney, F.Z.S., dated Northrepps, Norwich, May 23rd, 1876. Mr. Gurney stated that a pair of the variety of the Common Swan, usually called the Polish Swan (*Cygnus immutabilis* of Yarrell), which had been deposited by the Society under his care for the purpose of breeding, had just hatched five healthy Cygnets, which did not appear to Mr. Gurney to differ materially from those of the ordinary form. The general colour of the upper parts was brownish grey with a slight tinge of dull pale rufous; the head, throat, and breast were white. The white colour, however, was not abruptly marked off from the grey, but the boundaries of the two tints were somewhat blended.

Mr. Sclater remarked that the usual notion was that in the Polish Swan the Cygnets were invariably of a pure white*, and that it was for the purpose of ascertaining whether this idea was correct that the pair of Swans in question had been placed under Mr. Gurney's charge, at the suggestion of Prof. Newton, in order that they might have a better chance of breeding. The Swans had been originally received of a dealer in exchange in May 1871, and had not bred in the Society's Gardens, the space available for them being too limited.

The following papers were read:—

1. Notes on the Skeleton of *Ziphius novæ-zealandiæ*. By Julius von Haast, Ph.D., F.R.S., Director of the Canterbury Museum.

[Received May 5, 1876.]

(Plates XLV. & XLVI.)

At the end of July 1872 the report reached me that a Whale had been stranded on a reef in Lyttelton Harbour, Banks Peninsula, and that the carcass had been towed to one of the small bays by several fishermen for securing the oil.

Being myself prevented by indisposition, Mr. Fuller, the Taxidermist of the Museum, proceeded to that locality with instructions to secure the skeleton and to make the necessary observations as to the dimensions, form, sex, and age of the animal.

When he arrived where the fishermen were at work, he found that the blubber had nearly all been taken off, so that he could only partially obtain the required measurements.

The animal, which on dissection proved to be an aged female, had a total length of 26 feet; and Mr. Fuller describes the body as being rather thick in the middle, tapering to a slender tail without showing the least trace of any dorsal fin. Colour bluish black on the upper portion of the body, white beneath, the upper portion being marked with numerous oval spots, 2 to 3 inches across, like the skin of a Leopard.

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* See Yarrell's 'British Birds,' vol. iii. p. 131 (1843).

Fig. 1

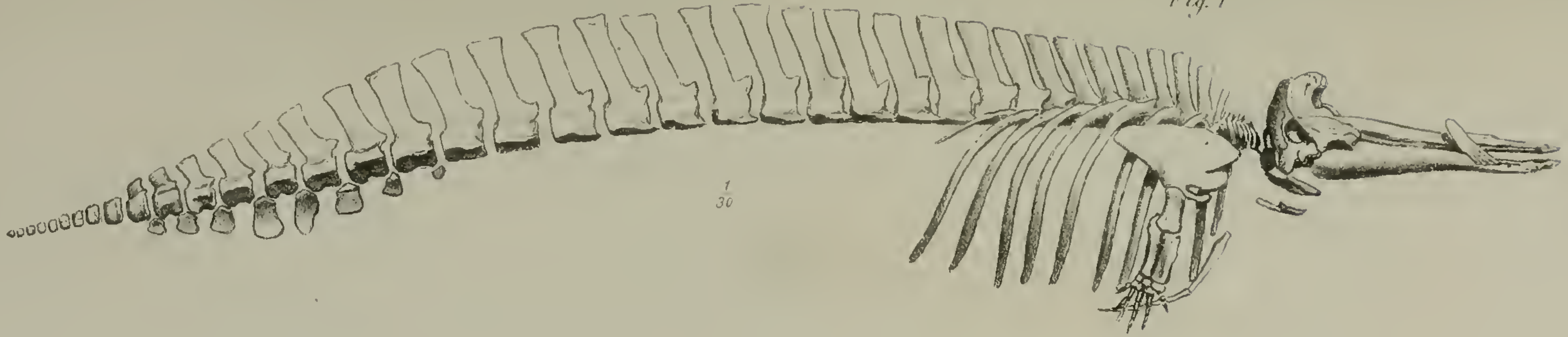
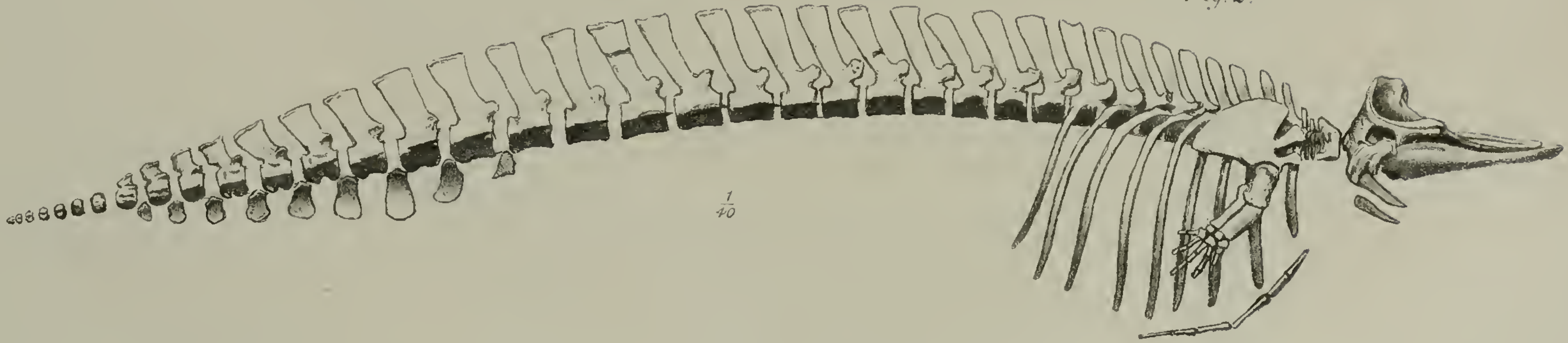


Fig. 2.



J Smit lith.

Hanhart imp.

Fig 1 SKELETON OF MESOPLODON FLOWERI
Fig 2. SKELETON OF ZIPHIUS NOVÆ ZEALANDIÆ

BRITISH MUSEUM
Z D
NATURAL HISTORY

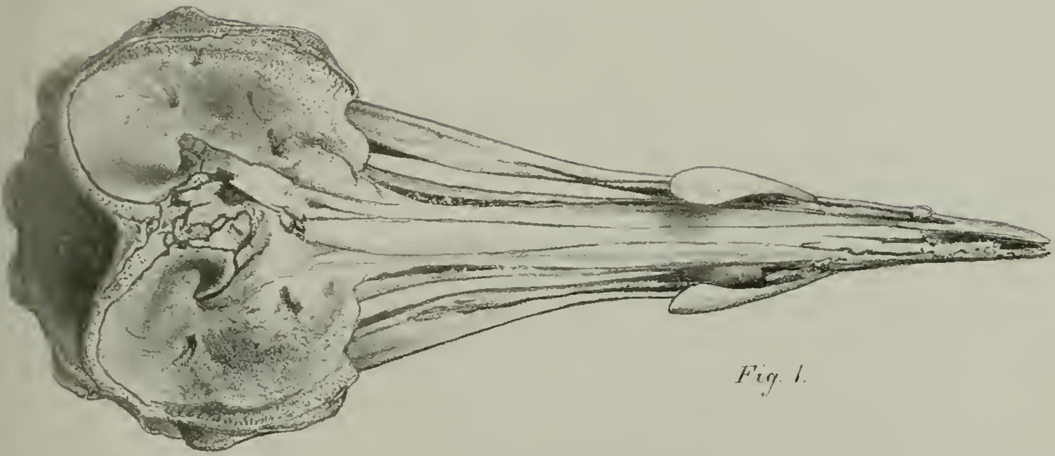


Fig. 1.

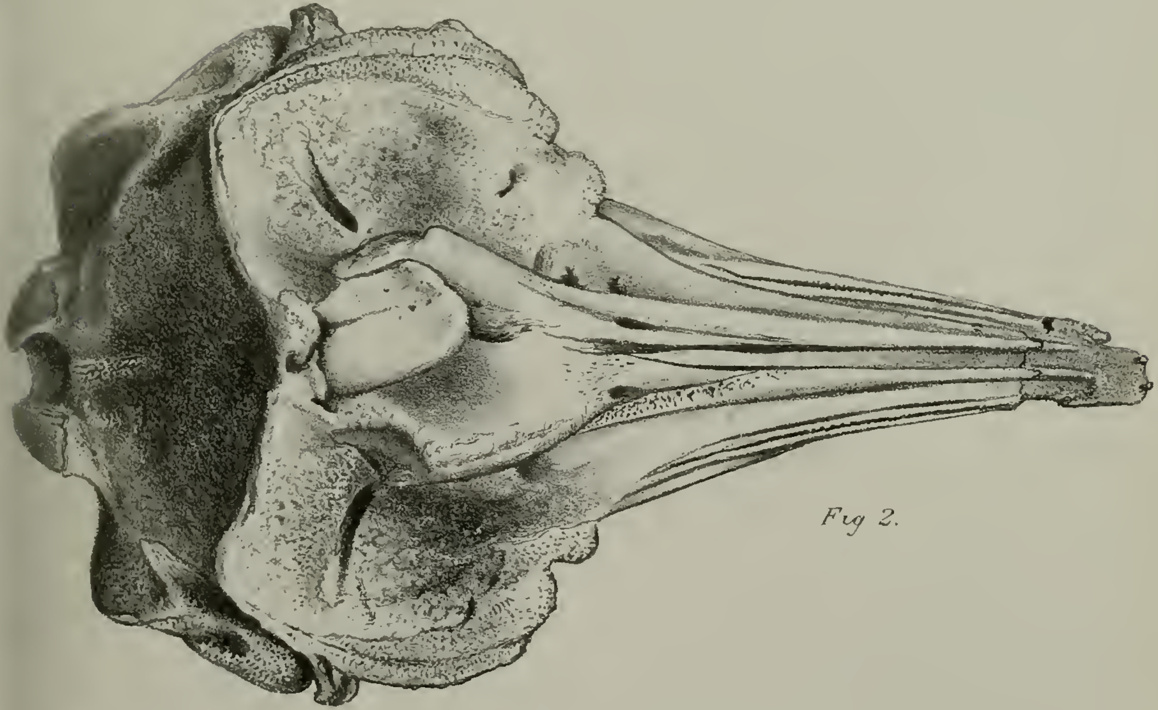


Fig. 2.

J. Smit lith.

Hanhart imp.

Fig. 1. SKULL OF MESOPLODON FLOWERI, *upper view*
Fig. 2. SKULL OF ZIPHIUS NOVÆ ZEALANDIÆ, *upper view*

BRITISH MUSEUM
Z D
NATURAL HISTORY

The head was much swollen. The whole skeleton, with the exception of a few bones, was secured for the Canterbury Museum, where it now stands articulated in one of its rooms. The accompanying drawing (Plate XLV. fig. 2) gives its outline.

Before, however, entering into a description of the principal portions of the skeleton, I wish to draw attention to the fact that our specimen did not possess a dorsal fin; nor did a careful examination by Mr. Fuller of the central line of the back reveal the least fragment of one, or even the indication that it ever existed. However, this absence cannot be claimed as a generic character, because the *Ziphius australis* of Burmeister (see the excellent Memoir on that species in 'Anales del Museo Publico de Buenos Aires,' part v., by that distinguished veteran naturalist) possesses a well-developed dorsal fin.

Moreover the forehead of the New-Zealand species is much swollen, whilst the head of the South-American species previously alluded to is tapering. Thus, in the enumeration of the principal characteristics of the genus *Ziphius* (see amongst others Gray's 'Catalogue of Seals and Whales,' page 340), this feature also must lose generic value. Dr. Hector, in the 'Transactions of the New-Zealand Institute,' vol. v. page 165, has given a short description of the skull of a specimen, under the name of *Ziphius chathamiensis*, which, if not belonging to the same species, is closely allied to the animal of the New-Zealand coast. That skull was obtained on the Chatham Islands.

However, as amongst minor differences the form of the teeth is different, I have thought it more expedient to describe the New-Zealand specimen under the specific name of *Ziphius novæ-zealandiæ*, leaving it to the future student, when more material has been collected, to determine whether there are two distinct species or not.

The skull (Plate XLVI. fig. 2) has the following dimensions:—

	ft.	in.
Extreme length with lower jaw	3	3·12
Extreme length of cranium, point of rostrum (which is broken off) restored	3	1·50
Length of rostrum, from the apex of the præmaxillæ to the middle of the line drawn between the anteorbital notches	1	7·89
Greatest height, from top of nasals to lower border of pterygoids	1	5·52
Greatest breadth, across postorbital processes of frontals	1	10·75
Breadth of occipital condyles....................		6·30
,, of foramen magnum....................		42·0
Height of foramen magnum		2·22
Breadth of base of rostrum between bottom of anteorbital notches	1	0·91
Breadth of rostrum in the middle		4·83
Anterior nares, greatest width of the two		3·20
Height of crest above occipital foramen	1	2·93
Width of occiput	1	4·60

Mandible.

	ft.	in.
Length of ramus	2	8·50
,, of symphysis		7·46
Vertical height of ramus at coronoid process		6·40
Apex of mandible, projecting beyond apex of rostrum (restored)		1·62
Mandibular tooth (right), length		2·12
,, ,, greatest breadth		0·72
,, ,, weight	184 grains.	

It will be seen, in comparing these dimensions with those of the skull from Chatham Islands, figured and described by Dr. Hector, that it is larger and more developed, with the exception of the two mandibular teeth, which are much smaller and in the Chatham-Island specimen are evidently designed for other purposes.

The rostrum, of which the point is broken off, is of small dimensions when compared with the posterior portion of the cranium, its point being slightly turned to the right. This point was shattered into such a number of small pieces that, after maceration, it was impossible to secure them all. The same was the case with the point of the lower jaw, so as to suggest to us that the animal had struck the reef and thus injured so considerably that portion of its frame.

The *premaxillaries* are two thin bones which run parallel in their anterior portion. They here curve inwards, so as to form a semicylindrical excavation, running along the whole rostrum as far as the septum narium.

Before reaching this, however, they alter somewhat their general form, the rounded edge disappearing, the bones now showing a plane rather concave surface, and, gradually rising near the posterior end of the nares, unite here with the nasal bones, by which a high crest is formed. For about one third from the point both sides of the premaxillaries are alike, after which the right one becomes much broader than the left one ; and, passing over the median line of the skull to the left, the skull now becomes very unsymmetrical in its central portion, so that the opening of the nares is displaced to the left. Moreover the uppermost portion of the right premaxillary, besides being broader, is much higher than the left one—a peculiarity to which also the nasal bones conform, the right one being considerably higher than the left one. The prefrontals (of Owen) begin 6·5 inches from the anterior point of the rostrum, gradually widening to one inch, being slightly concave in the centre for a length of 8 inches. They then gradually flatten for a distance of one inch, after which they become convex until they rise and form the thin ridge of the septum narium. The latter is wedged in its anterior portion against the left premaxillary, and, continuing its direction to the left, joins then obliquely the nasal bones. In the centre of the nares, the septum narium is excavated for a depth of nearly 2 inches and a width of 1·20 inch, the bone having here a very sharp edge.

Shortly before the septum narium is formed, the premaxillaries coalesce for a short space*.

The *maxillaries*, which begin with a narrow point having a downward sloping surface, gradually widen ; and, after having in about the centre of the rostrum a plane surface, the outer side rises to the orbital notch, after which they expand greatly with a deeply concave surface, rising posteriorly to the highest part of the crest, uniting with the frontals through their whole extent.

The high maxillary crest of *Hyperodon* is represented only by a small elevation at the begining of the broad concave surface, similar to that in *Ziphius australis*, as pointed out by Prof. H. Burmeister in his exhaustive description of that South-American species.

A deep and narrow furrow begins on the lower side of both premaxillaries near the point, continuing after their junction with the maxillaries along the latter bones, where it runs below their lateral edge to about the middle of the rostrum, gradually getting shallower and narrower. In these grooves small vascular cavities are observable, as if they had once served for rudimentary teeth, of which, however, not the least remnant could be observed, all without doubt having been absorbed.

The vomer begins 5·5 inches from the point of the rostrum between the premaxillaries, forming for 8·76 inches a narrow convex ridge, which in its broadest or central portion is only 0·25 inch broad. The palatal surface of the rostrum is slightly bent upward near the point.

The *united periotic and tympanic bones* are of considerably less size than those of *Berardius arnouxi*. The tympanic bone is shorter, the anterior end not being so much prolonged and thus resembling more in form the same bone in *Hyperodon*. The same can be said of the periotic bone, which is also not only shorter, but has the notches between the lobes much shallower than in *Berardius*.

The *lower mandible*, which projects about 2 inches beyond the point of the rostrum, consists of two thin callous rami, which gradually become narrower till their termination at the point, the bony substance of which they are composed getting more spongy towards the begining of the symphysis. From this beginning the united bones curve upwards. At the point two small teeth are imbedded in sockets, the tips rising only a few lines above them. They are covered with rugose cement to the very point, which, in their lower part, forms wartlike prominences.

As there is scarcely any difference between the two teeth, I give only the dimensions of one of them, the left one, which is 2·12 inches long, with the greatest breadth about at the centre of 0·72 inch. It weighs 184 grains, and runs out at both ends to a constricted rounded point, that of the apex being the narrowest.

It will thus be seen that the weight of this tooth, although it belongs to a skull of larger dimensions than the one obtained from the Chatham Islands, described by Dr. Hector, is scarcely the fourth of the weight of the tooth of the latter. It is moreover evident that the teeth of the Chatham-Island specimen must have been used, as, according to the description, they are worn down into two lateral facets, divided by an acute ridge (see 'Transactions New-Zealand Institute,' vol. v. page 165), whilst in the New-Zealand specimen the tips are as rough as the sides and roots and do not show the least sign of wear.

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* I give these details, because in another skull of the same species which the Canterbury Museum possesses, and of which I shall give the measurements with some notes below, besides some minor points, a very marked difference occurs in the form of the prefrontals.

We know that the two skulls of the New-Zealand specimens belong to female skeletons, whilst the skull of the Chatham-Island specimen may possibly have been that of a male; but as we have not the least evidence in that respect, this can only be settled by future researches into the anatomical characters of this interesting genus.

Returning to the skeleton under consideration, I wish to state that the teeth were only visible after maceration, and appear to be altogether functionless, because the lower jaw projects so much beyond the rostrum—unless we assume that the whole had an upper lip of a somewhat prehensile character. On the upper margin all along the anterior half of each ramus a well-defined groove extends to the dental canal at the anterior extremity, where it is broadest. A considerable number of small vascular canals open into this groove, without, however, showing the least rudiment of teeth.

The coronoid process is marked very feebly; but the condyle is well developed and forms the most posterior portion of the bone. I may here observe that the skull of *Ziphius novæ-zealandiæ* resembles in some respects that of *Ziphius australis* of South America, notwithstanding the difference in the form of the head, the former having a swollen, and the latter having a tapering forehead. In many instances Prof. Burmeister's excellent description of some of its osteological characters could be applied quite well to the New-Zealand species.

Hyoid bones.

The basihyal and the thyrohyals are still unankylosed, notwithstanding the great age of the animal. The former has a somewhat trapezoidal form, thus resembling in that respect the same bone in *Ziphius australis*; but it is more pointed in its anterior portion and has a deep notch in the centre, whilst in the South-American species the anterior border is only slightly concave. Breadth 4·6 inches, antero-posterior length on both sides of the notch 4·1 inches. The thyrohyals have a length of 6·80 inches, with their greatest breadth of 2·55 inches one third from their posterior end.

The stylohyals are 10·8 inches long, and, in their middle portion, 2·1 inches broad; they are straighter than the same bone in *Ziphius australis*, which they resemble, however, otherwise in form. The whole apparatus is more slender than in the Buenos-Aires species.

Vertebral Column.

The following are the numbers of vertebræ:—

Cervical	7
Thoracic	9
Lumbar	11
Caudal	19
	46

In comparing this number with that observed in *Ziphius australis*, it will be seen that the New-Zealand species has three vertebræ less, viz. 9 thoracic instead of 10, and 19 caudal instead of 21, thus showing also some difference in the osteological structure of the two species. I may here observe that all the epiphysal plates of the vertebræ are so thoroughly coalesced with the rest of the body that the line of junction is not visible—a proof that the animal must have been not only adult, but aged.

Cervical Vertebræ.

Of these the first four are entirely ankylosed, whilst the 5th, 6th, and 7th are free, thus having one free vertebra less than *Ziphius australis*, in which only the first three cervical vertebræ are united; however, as this skeleton was derived from a young animal, this difference cannot be claimed as of a permanent character, until we know the skeleton of the same animal in a full-grown state. The atlas, which is 11·4 inches broad by 8·15 inches high, forms with the next two vertebræ one solid bone with a high crest; it is the largest of all the cervical vertebræ. The parapophyses (lower processes) in each of the coalesced bones, of which that of the atlas is the largest, are, with the exception of that belonging to the fourth, well developed. They decrease, however, gradually in size to the third, that of the fourth being of such small dimensions that it is an inch shorter than the same process in the preceding one, with which it is ankylosed at the upper and lower extremities, but not with the body.

The fifth cervical vertebra is very narrow, 0·55 inch; it has moreover no spinous process above the arch, the summit of which stands two inches below the point of the spinous process of the four ankylosed vertebræ; the parapophyses, although much larger than those of the fourth cervical vertebra, stand on the same line with them. The sixth cervical vertebra is a little broader than the preceding one; there is only an indication of a spinous process above the arch; the parapophyses are well developed, and advauce half an inch beyond those of the former vertebra.

The seventh vetebra is slightly broader than the preceding one. It has a distinct spinous crest standing two inches above the arch. The lower process, or parapophysis, on each side has dwindled to a narrow tubercle, sloping upwards; the body of the bone has a well-marked articular surface for the head of the first rib, on both sides, which is situated between the well-marked upper transverse process (diapophysis) and the small tubercle representing the lower transverse process (parapophysis). These seven vertebræ have a length of 7·15 inches measured along the lower side of their main body.

Thoracic Vertebræ.

Their number, as before stated, is nine. In this respect the New-Zealand species resembles *Hyperodon*, which, as far as I am aware, is the only other known Ziphioid Whale having such a small number of thoracic vertebræ. Each vertebra has a spine standing backwards at an angle of 60 degrees to the body of the vertebra. That of the first one is pointed, 6·4 inches high, and 2·05 inches broad at the base. Gradually these spinous processes rise higher and become broader at the same time, that of the 9th or last thoracic vertebra being the highest, 11·62 inches, and 3·46 inches broad at the base. They are all laterally compressed, thinning out at the top to a mere blade.

The first two vertebræ possess on both sides of the arch a rounded apophysis, on which the articular extremity for the tubercle is placed. This apophysis gradually enlarges, being laterally compressed and showing one well-marked process pointing upwards and forwards, as well as the articulation for the tubercle for the rib, which is situated more backward.

On the seventh vertebra this separation of the apophysis is still more conspicuous, whilst on the eighth vertebra a separation of that apophysis into two distinct portions has taken place, the forward or superior process now appearing as the metapophysis, whilst its lower or posterior portion forms now a lower transverse process, on which the articular surface for the eighth rib is situated, directed obliquely backwards.

This lower transverse process is already situated in front, on the body of the vertebra, but on its upper portion. This division is still more conspicuous in the ninth or last thoracic vertebra, where the metapophysis has nearly the same form as that on the first lumbar vertebra, with the exception that its upper surface has a rounder instead of a horizontal edge. The lower transverse process has a more depressed, flattened form; moreover it is situated not only in the centre of the body of the vertebra, but also lower down and nearly on the same level as the same process in the first lumbar vertebra.

The bodies of the vertebræ gradually increase in size, the first having an antero-posterior length of 1·65 inch, and the ninth, or last, of 4·1 inches.

The inferior surface of the first thoracic vertebra is rough and rounded. The second, third, and a small portion of the anterior part of the fourth have a shallow concave groove, after which on the fourth a median keel appears, which continues to run along the rest, gradually becoming more pronounced.

Lumbar Vertebræ.

The nine thoracic vertebræ are succeeded by eleven lumbar vertebræ, which nearly all possess the same form, attaining larger dimensions as they follow each other, so that the body of the last is the largest—viz. 5·48 inches for the first, and 7·58 inches for the last lumbar vertebra. The spines are of considerable size, the first being 13·25 inches high along its posterior margin; they then gradually rise to the eighth, which is 15·52 inches high, after which they diminish again slightly. They are compressed as usual, and broader at the apex, which has a truncate form, as if they were cut off.

The metapophysis on the anterior end of the arch is similar in form to that of the last thoracic vertebra, but a little larger in the first four vertebræ, its apex having moreover a still more truncated edge. Beginning with the fifth vertebra this process gets gradually smaller, assuming at the same time a more rounded form. They all possess on their inferior surface a median keel, which is most pronounced on the 5th, 6th and 7th vertebræ, after which, getting shallower by degrees, it nearly runs out on the last.

The lower transverse process is throughout of the same form and size, having a horizontal and a little forward direction.

The *caudal vertebræ* are 19 in number, of which the first 10 have chevron bones attached to them on the posterior border of the lower surface, thus forming as usual two distinct classes.

The bodies of the *caudal vertebræ* shorten from 7·51 inches to the tenth, which is only 3·78 inches long, although their height is the same.

From the 1st to the 13th a broad shallow groove runs along their lower surface, after which they have a deep lateral excavation.

The spines are also gradually reduced in height to the tenth, in which the same is only 1·50 inch high. They continue, however, to possess the same truncated apex, with a downward slope from front to back, getting at their starting-point from the arch gradually larger, that on the 4th caudal vertebra being here the largest of the whole series of vertebræ.

The metapophyses also gradually diminish, and assume, instead of the former flattened form, now a stouter appearance with a more outward direction of the point.

The same diminution in size is observable in the lower transverse process, which on the 8th caudal vertebra forms only a very small ridge, but has entirely disappeared on the 9th. The 10th vertebra is very much laterally compressed; the 11th assumes a rounded form, which becomes more square in the 12th, after which the rest have a nearly quadrangular form to the last.

The last caudal vertebræ, beginning with the 10th, have a well-excavated channel running along both sides of the vertebræ. I may here observe that the last chevron bone, as well as the 17th and 19th vertebræ, are missing.

Ribs.

There are nine ribs on each side, of which seven possess two articulating processes. The first, which is the shortest of the whole series, is also the broadest. It is thick and flattened throughout. It articulates by a distinct capitular process with the body of the seventh cervical vertebra, and above by an excavated articular surface with the transverse process of the first thoracic vertebra.

From the second to the sixth, the ribs gradually lengthen, the sixth being the longest, after which they decrease again. The second has still the flattened appearance of the first, but in a lesser degree, after which they assume all nearly the same shape, the upper portion below the articulations or articulation having a prismoid form, which is most pronounced in the middle of the ribs, where they are also the most constricted, the edge being on the inner side; they then widen and flatten to their lower extremity.

The second to the seventh rib inclusive have, like the first, two articulations; a distinct capitular process for articulation with the vertebra in front, and an excavated articular surface slightly raised round the edges, into which the transverse process fits.

The eighth and ninth ribs have only one excavated surface, articulating with the end of the transverse process.

The greatest length of each rib, measured in a straight line, is:—

	ft.	in.
First	1	9½
Second	2	6½
Third	2	10¼
Fourth	3	0½
Fifth	3	2
Sixth	3	3¼
Seventh	3	2¾
Eighth	2	11¼
Ninth	2	5½

Sternum.

In the form of the sternum *Ziphius novæ-zealandiæ* shows a well-marked difference from *Z. australis* of Buenos Aires. It consists of five distinct segments, of which the first is the largest, having a greatest length of 14¼ inches, with a greatest breadth of 12½ inches.

The second, third, and fourth segments gradually diminish in both dimensions until the fifth, which is the narrowest but longer than the three preceding ones. The dimensions of the fifth are 7¾ inches in length with a breadth of 6 inches.

The first, which possesses a shallow keel in its upper portion, has a deep notch above it, and another in the centre of its basal portion. Similar fossæ exist in each of the succeeding segments, by which four median fenestræ are formed, gradually dimininishing in size, having their largest diameter in a vertical direction. There are six articular surfaces on each side for the sternal ribs—the first near the upper portion of the first segment, the second at the junction of the first and second, the third at the junction of the second and third, the fourth at the junction of the third and fourth, the fifth at the junction of the fourth and fifth segments, and the last at the posterior ends of the two narrow processes by which the fifth segment terminates. The entire length of the sternum in a straight line is 3 feet 1 inch.

A comparison with the sternum of *Ziphius australis* shows a great difference in the form of the segments of the fenestræ; and, as it appears to me, when mature, this species would only have four segments instead of five, thus agreeing with *Berardius arnouxi.*

Prof. Flower, in his excellent Memoir on *Berardius arnouxi*, figures the sternum as consisting of five pieces; but it is evident that the fourth and fifth segments are portions of the same bone, although they from some cause have not ankylosed.

In a skeleton belonging to the same species, which stands articulated in the Canterbury Museum, and which has been taken from a full-grown but not aged male, the disks on both sides of the vertebræ being not yet ankylosed, the sternum consists of only four segments.

The fourth and fifth pieces of the skeleton in the Hunterian Museum appear as one bone without any suture visible between them, the last two articular facets standing close to each other on the side of the fourth segment.

Pectoral limb.

The scapula has the usual form peculiar to the Ziphioid Whales; the acromion, however, is narrower and thinner than in *Z. australis*, in which that bone corresponds more with *Berardius arnouxi*. The coracoid is also shorter and stouter.

The humerus, to which the head is thoroughly ankylosed, has a well-defined tuberosity for articulation with the strongly excavated glenoid fossa of the scapula, and on its lower posterior side a groove for the articulation of the ulna; both ulna and radius have their articular surfaces well ankylosed, and do not call for any further remark.

The carpus differs considerably from that of *Berardius arnouxi*, of which Professor Flower gives a figure, and with which the carpus of another specimen articulated in the Canterbury Museum fully agrees. Instead of being united in pairs, the scaphoid and lunar and the cuneiform and unciform are all distinct, and only the magnum and trapezoid are united into one bone. They agree in this respect with the same elements in the carpus of *Mesoplodon sowerbiensis* of the Northern Hemisphere, whilst in the skeleton of *Ziphius australis* the magnum and trapezoid are also still separate bones. However, as this skeleton is derived from a very young animal, it may be possible that they unite in more aged individuals.

Notes on another Specimen.

A female Whale of somewhat larger dimensions, belonging to the same species, was stranded about the middle of July 1873 in Akaroa Harbour. According to Mr. Gorham Lambert, my informant, the animal was suckling a calf at the time; the latter, however, was thought not worth preserving by the finder. The skull of the mother Whale was secured for the Canterbury Museum.

From the following table of measurements it will appear that the skull is a little larger in all its dimensions than the one described previously, belonging to the skeleton in the Canterbury Museum.

Although the point of the rostrum is quite entire, the point of the lower jaw was considerably broken, which proves that the animal made considerable struggles to regain deep water, during which without doubt it injured itself in the same manner as the Lyttelton-Harbour specimen did. The skull under review is also derived from an aged individual; and, with the exception that its rostrum is rather narrower than that of the Lyttelton-Harbour specimen, it has otherwise somewhat larger proportions. The most marked difference, however, is in the form of the prefrontals. In this skull the premaxillaries are much more excavated, and stand 1·53 inch apart in the centre of the rostrum.

The prefrontals, as in the former skull, begin 6·50 inches from the point of the rostrum, forming at the beginning a ridge, which continues for about 11 inches, constituting the central portion of these bones and only gradually disappearing. For the last 5 inches they have a concave form; the premaxillaries here approach each other as in the Port-Lyttelton specimen, but stand always half an inch apart.

Here the beginning of the septum narium rises to within the eighth of an inch of the surface of the premaxillaries, gradually getting thinner and turning obliquely to the left, resting against the left of these latter bones.

The excavation in the septum narium, however, is much deeper and wider than in the first-described skull, being 3 inches wide and 2½ inches deep.

There is also considerable difference in the teeth of the two skulls. The tooth of this skull is 2·85 inches long, and 0·61 inch broad; it is covered everywhere with rough cement, which forms, principally near the lower extremity, wart-like protuberances, taking near the root-end ridgy forms. It is consequently longer than the tooth of the Lyttelton-Harbour specimen, and, although the tenth of an inch thinner, is a little heavier (198 grains).

A portion of the pterygoid has been cut away when taking out the skull; otherwise it is in a fine state of preservation.

Table of Measurements.

	ft.	in.
Extreme length of skull with lower jaw	3	4·90
,, ,, of cranium	3	3·15
Length of rostrum from the apex of the præmaxillæ to the middle of the line drawn between the anteorbital notches	1	10·50
Greatest height from top of nasals to lower border of pterygoid..............................	1	5·85
Greatest breadth across postorbital processes of frontals	1	9·12
Breadth of occipital condyles..................		7·20
,, of foramen magnum..................		2·62
Height of foramen magnum		2·31
Breadth of base of rostrum between bottom of anteorbital notches	1	0·50
Breadth of rostrum in the middle		5·00
Anterior nares, greatest width of the two		3·05
Height of crest above occipital foramen..........	1	3·20
Width of occiput	1	5·05

Mandible.	ft.	in.
Length of ramus	2	9·75
„ of symphysis		7·25
Vertical height of ramus at coronoid process		6·83
Apex of mandible projecting beyond apex of rostrum		1·75
Mandibular tooth, length		2·85
„ „ breadth, greatest		0·61

2. Remarks upon Dr. von Haast's Communication on *Ziphius novæ-zealandiæ*. By Professor Flower, F.R.S.

[Received June 5, 1876.]

I have to make the following remarks upon Dr. v. Haast's communication which has just been read to the meeting.

1. It should be stated that Dr. von Haast in his MS., which he submitted to me, has followed Dr. Gray in using the generic name *Epiodon* for the animal described; but I have taken the liberty of substituting the Cuvierian epithet *Ziphius*. With reference to the revival of the former name, I fully agree with the following remarks of Fischer*:—

"M. Gray considère l'*Epiodon urganantus* de Rafinesque† comme le type de *Ziphius cavirostris*. L'*Epiodon urganantus* est, pour Desmarest, son *Delphinus epiodon*; et voici les caractères qui lui sont attribués par Rafinesque.

'Corps oblong, atténué postérieurement; mâchoire inférieure plus courte que la supérieure; plusieurs dents obtuses, égales à celle-ci; aucune à la première; pas de nageoire dorsale.

'*Habite* la mer de Sicile.'

"Comme on le voit, le genre *Epiodon* et l'espèce *urganantus* sont plus que brièvement décrits; je pense qu'il est absolument impossible de les reconnaître, et qu'il serait sage de laisser reposer en paix les diagnoses de Rafinesque; on ne doit pas accorder de notoriété scientifique à de pareils travaux."

If, therefore, *Epiodon* is to be used for the present form, the almost universally received and well-characterized *Ziphius*‡ would have to be discarded from zoology, as it cannot be with any reason or propriety transferred, as Dr. Gray has done, to another and very distinct genus (*Mesoplodon*, Gervais). It must be retained for *Ziphius cavirostris* and its allies, or given up altogether.

2. I do not see that Dr. v. Haast has given any grounds for distinction between his *Z. novæ-zealandiæ* and the previously described

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[*] "Mémoire sur les Cétacés du genre *Ziphius*, Cuvier," Nouv. Arch. du Muséum, tome iii. p. 42.

[†] 'Précis des découvertes et travaux somiologiques,' &c., p. 13 (Palermo 1814).

[‡] Cuvier, 'Ossemens fossiles,' 2nd edit. vol. v. 1824.

Z. chathamiensis (Hector) from the same seas*. Indeed, so far as can be judged from the description and photographs, the two specimens attributed to the former differ more from each other than does either of them from *Z. chathamiensis*, especially if, as Dr. v. Haast himself suggests, the difference in the size of the teeth is a sexual character.

3. The photographs sent by Dr. v. Haast of *Z. novæ-zealandiæ*, when compared with the specimen of *Z. indicus*, Van Beneden (*Petrorhynchus capensis*, Gray), at the British Museum, do not show any greater differences than are consistent with the range of individual variation.

4. The differences between the last-named species, or supposed species, and *Z. cavirostris*, Cuvier, and *Z. australis*, Burmeister, have never been clearly defined; no proof has therefore yet been given of the existence of more than one species of the genus.

5. Dr. v. Haast's specimen differs from all other known skeletons in having but nine ribs instead of ten. But it is not improbable that the last pair (often rudimentary and unattached to the vertebral column) may have been lost during the preparation. This appears more likely, because the ninth rib (as shown in the photograph) is larger than the last rib usually is in these animals, and the transverse process of the supposed first lumbar vertebra appears somewhat dilated at the end. Moreover the presence of one pair of ribs more or less is often only an individual character in the Cetaceans.

6. A more serious difference consists in the absence of the dorsal fin (hitherto met with in all members of the genus examined); but it must be noted that this is not Dr. v. Haast's own observation, and was made after "nearly all the blubber had been taken off."

3. Notes on *Mesoplodon floweri*. By Julius von Haast, Ph.D., F.R.S, Director of the Canterbury Museum, New Zealand.

[Received May 5, 1876.]

(Plates XLV. & XLVI.)

In the beginning of April 1874, the information reached me that a Whale about 18 feet long had been stranded on the sea-beach near Saltwater creek, about 30 miles north of Banks Peninsula; and although I did not lose any time in securing the skeleton for the Canterbury Museum, I was too late to obtain the necessary information as to form, colour, position of fins, etc., the animal having in the mean time been stripped in order to obtain the blubber.

Fortunately, however, no bone was lost; and on examination the animal proved to be a *Mesoplodon*, closely allied to a specimen obtained at the Cape of Good Hope, of which the skull has been described and figured by Dr. Gray, P. Z. S. 1865, p. 358, and subsequently by Prof. Owen, in vol. xxiii. of the publications of the Palæontographical Society of London, under the title of *Ziphius* (*Dolichodon,* Gray) *layardi.*

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* Trans. New-Zealand Institute, vol. v. p. 164, pl. iv. (1873).

So far as I am aware, nothing is known of that interesting animal except the skull with the lower jaw, between which and the New-Zealand specimen under review there exist some points of difference, as I shall point out further on; moreover, as I believe that the same species of Ziphioid Whale would scarcely exist in two regions so far distant from each other, I have thought it more expedient to designate the New-Zealand species by the specific term *floweri,* in honour of the accomplished anatomist, Prof. W. H. Flower, F.R.S., to whom the New-Zealand naturalists owe a great debt of gratitude for his excellent memoir on *Berardius arnouxi.*

The animal proved, on dissection, to be a full-grown male and or mature age, the terminal epiphyses of the bodies of the vertebræ being so thoroughly ankylosed that the line of junction could not be detected; and we can draw the conclusion from its osteological characteristics that it must have combined considerable strength with great swiftness, whilst at the same time the large and remarkable strap-like teeth must have given it a peculiar appearance.

The skeleton (Plate XLV. fig. 1), as now mounted, has a total length of 17 feet 9 inches, which closely corresponds with the measurement given to me, and taken before the flesh was removed from the skeleton.

The skull, of which I add an upper view (Plate XLVI. fig. 1), resembles in all its general features so closely the skulls of *M. layardi,* as described by Prof. Owen, that it would be superfluous to offer any detailed account of it.

Amongst other peculiarities, the frontals have also the same well-defined form, and appear as a dense convex ridge between the premaxillaries as in the Cape specimen.

Notwithstanding this general likeness, if we compare closely the figures of both skulls, it is nevertheless apparent that there exist some differences between them, of which I wish to point out the following ones:—

Thus the frontals in the Cape specimen rise higher above the maxillaries than in the New-Zealand specimen; and the occipital portion of the skull is far more rounded in the former than in the latter, in which the supra-occipital stands nearly vertical, whilst in the Cape specimen this portion of the skull has a considerable slope towards the foramen magnum. At the junction of the basioccipital with the temporal, the former enters the latter with a sharp angular projection, whilst in the New-Zealand specimen it has a rounded edge.

The interparietal in the New-Zealand specimen runs up to the crest a much narrower bone than in the Cape one, in which it has a rounded form near its junction with the frontals.

Besides the difference in the mandibular teeth to be pointed out hereafter, I find that the lower jaw is far deeper in proportion to its length in the New-Zealand specimen.

Measured on the drawing of that bone in the figure given by Prof. Owen, the total length of the lower jaw of *M. layardi*, from the point to the angle, is to the greatest depth as $8\frac{1}{5}$ to 1, whilst in the New-Zealand specimen it is as $6\frac{1}{2}$ to 1. In *M. layardi* the lower jaw is much more slender, the upper and lower border being very slightly inclined to one another, whereas in *M. floweri* the two borders form a much more open angle with one another, the upper border being very convex near the coronoid process. If both skulls were available for comparison side by side, I have no doubt that other differences would be detected, especially by a comparative anatomist of more experience than I possess.

There is an important difference in amount of curvature of the large tooth on each side of the lower jaw, which in the Cape specimen is so much arched that the apices of both teeth actually meet above the rostrum, a peculiarity which the late Dr. Gray thought could scarcely be a malformation. In the New-Zealand specimen that curvature, although existing, is not so pronounced, the point of the tooth standing in a vertical line above the centre of the root. Its form and position agree entirely with those of the tooth of a lower jaw brought from the Chatham Islands by Mr. H. Travers, and described and figured by Dr. Hector as *Dolichodon* (*Mesoplodon*) *layardi* in the fifth volume of the 'Transactions of the New-Zealand Institute.' Behind this mandibular tooth there is no partial hollow on the upper margin of the lower jaw, as if it were the cavity of an old tooth that had fallen out, as is the case in the Cape specimen, and which was first pointed out by Dr. Gray in his 'Catalogue of Seals and Whales in the British Museum.' The New-Zealand specimen under review thus conforms also in this respect to the lower jaw obtained in the Chatham Islands.

The anterior edges of both teeth, however, are perfectly intact, and not worn away like those in the Cape and Chatham Island specimens; a peculiarity which might be traced to individual habits, and is, I suppose, not of any specific value. There is no doubt that the New-Zealand and Chatham-Island specimens could open their mouths, as there is sufficient space for the rostrum to pass between the apices of the teeth. However, there has evidently been some abrasion on the inner side of both teeth near the crown, as they are here somewhat worn down and polished. The small enamelled portion rising on the anterior edge of the apex is not quite so large as in the Cape specimen.

The lower jaw from the Chatham Islands is 1·75 inch shorter than that of the specimen under review, in which latter the mandibular tooth is also much longer, which may be regarded as an individual difference only.

The following Table of measurements will also supply further material for comparison:—

Dimensions of the skull.	ft.	in.
Extreme length of cranium................	3	5·75
Length of rostrum from the apex of the præ-		

	ft.	in.
maxillæ to a line drawn between the anteorbital notches	2	3·48
Greatest height from top of nasal to lower base of pterygoids	1	3·80
Greatest breadth across postorbital process of frontals	1	3·22
Breadth of base of rostrum between bottom of anteorbital notches		5·90
Breadth of rostrum in the middle		2·71
Greatest width of the two nares		2·15
Height of crest above occipital foramen		8·75
Distance from point of rostrum to crest over blowers (in a straight line)	2	8·48

Mandible.

Length of ramus	2	10·75
Length of symphysis		8·05
Vertical height of ramus at coronoid process		4·82
Distance from the condyle to the hinder edge of the base of the mandibular tooth	1	9·53
Breadth of exposed part of mandibular tooth along upper margin of ramus		4·51
Length of mandibular tooth measured along anterior edge from upper margin of ramus to crown		8·74

Hyoid Bones.

The basihyal and thyrohyal are united into one bone; the two latter are each 4·5 inches long and 2·1 inches broad at their junction with the basihyal. The anterior edge of this bone is formed by two processes, advancing considerably beyond its general outline and separated in the centre by a deep notch, in which respect the bone resembles that of *Epiodon novæ-zealandiæ.*

The two posterior points of the thyrohyals stand 7·2 inches apart.

The stylohyals are 7·5 inches long; they possess a distinct head for their articulation with the skull, and have afterwards for some distance still a roundish form, then gradually flattening till about 2·5 inches from their anterior end they are 1·75 inch broad and 0·5 inch thick, the upperside having a sharp ridge and the lower side being flattened.

Vertebral Column.

The number of vertebræ are as follows:—

Cervical	7
Thoracic	10
Lumbar	10
Caudal	19
	46

Mesoplodon floweri thus agrees in these particulars with *M. sowerbiensis.*

Cervical Vertebræ.

Measured along the lower side of their main bodies, the seven cervical vertebræ have a total length of 5·75 inches. Of them, the atlas, second, and third vertebræ are united into one large triangular bone 8 inches broad and 6·10 inches high (see no. 16). Only their lower processes, of which those of the second are the largest, are free. The third vertetebra has two distinct transverse processes on each side, of which the higher one (diapophysis) is a thin bone, with its termination pointing downwards. The next four vertebræ are all free; and if we take into consideration that the skeleton under review belonged to a fully adult animal, there is no doubt that no further change in their relations to each other would have taken place.

The upper as well as the inferior transverse processes become gradually smaller as we advance towards the thoracic region. In the fourth vertebra the inferior transverse process has still a horizontal direction; in the fifth it assumes a downward slope, which is continued to the seventh, where it consists only of a small tubercle. Above it, on the side of the body of this vertebra, is the articular surface for the head of the first rib. The fourth vertebra had evidently a small spinous process, which doubtless was broken off in cleaning it; in the fifth the spinous process is 1·05 inch, in the sixth 1·53 inch, and in the seventh 2 inches high, all leaning a little forwards. The bodies of the last four vertebræ are broader than they are high. *M. floweri* therefore stands so far alone in regard to the arrangement of the cervical vertebræ, as no other Ziphiod Whale, so far as I am aware, has the first three cervical vertebræ ankylosed and each of the next four perfectly free.

Thoracic Vertebræ.

The species under review possesses ten, of which the bodies are all flattened from top to bottom and become gradually of larger dimensions, the body of the first being 1·12 inch, and the tenth 4·20 inches in postero-anterior length. The spinous process of the first is pointed and stands slightly forwards; that of the second stands nearly vertical, after which in the remaining eight vertebræ it gradually slopes more and more backward and becomes higher and broader. This process in the second and third has rather a rounded apex, after which it becomes more truncated in the rest.

The height of the spine of the first thoracic vertebra is 4·25 inches, of the tenth 9 inches.

The articulation for the head of the second rib is situated at the posterior end of the first vertebra, low, at the base of the arch; it rises gradually in the two next, so that in the third vertebra this articulation is placed some distance above that base, a position which it maintains in the fourth, fifth, and sixth, after which it disappears, the following ribs having only one articulation.

The transverse process, which springs from both sides of the arch, is in the first three vertebræ a rounded apophysis; in the next four vertebræ it gradually enlarges, becoming, as in *Epiodon novæ-zealandiæ,* laterally compressed, showing one strongly marked process pointing upwards and forwards, as well as a well indicated and posteriorly situated articulation for the tubercle of the ribs. A separation into two distinct processes takes place in the eighth, the forward or anterior process of the apophysis now appearing as the metapophysis, and its lower or posterior process forming a lower transverse process, starting as a small rounded prominence from the anterior border of the upper portion of the body, and on which the articular surface for the eighth rib is situated, directed obliquely backwards.

In the ninth vertebra this separation is still more accomplished, the metapophysis being well developed, and the transverse process, which springs now from near the centre of the body, although thicker and more rounded than those of the succeeding vertebræ, takes already its usual form. It has an articular surface for the ninth rib on its posterior end, with the same direction as in the preceding one.

The tenth vertebra, which is the largest of the series, has a very large transverse process, depressed and broad, on the edge of which the tenth small rib obliquely articulates. This transverse process is the broadest and longest of the whole series of vertebræ—those of the lumbar region, beginning with the first, getting by degrees shorter and narrower.

The transverse process of the ninth thoracic vertebra has a horizontal and somewhat backward direction; that of the tenth stands straight; whilst the same process in the lumbar and in the first series of the caudal vertebræ has, besides a slightly downward, also a forward direction. The bodies of the thoracic vertebræ up to the seventh have a flattened lower surface, after which a keel starts on the eighth, which is well pronounced on the ninth and tenth.

Lumbar Vertebræ.

The ten lumbar vertebræ resemble each other very much in form. Gradually they become more elongated, the first having an antero-posterior length of 4·55 inches, and the eighth of 6·30 inches, after which they shorten again a little. They possess each a median keel, and are compressed in the centre below the transverse process. The spinous processes are large and high, increasing to the eighth, which is 11·50 inches high, after which they slightly decrease. The arches arise from the centre of the bodies, thus differing from *Berardius* and *Epiodon,* where they have a more anterior position.

Caudal Vertebræ.

There are nineteen caudal vertebræ, of which the first ten have a deep channel running along their lower surface. The spinous processes gradually lose in height, that of the tenth vertebra consisting only of a slight excrescence. The lower transverse processes also shorten by degrees, so that in the sixth they are represented by a small horizontal ridge, which is only faintly indicated in the seventh. In the eighth, ninth, and tenth vertebræ all signs of such processes are missing; but they are also strongly laterally compressed. There are nine chevron bones, of which the last is missing. With the eleventh vertebra the second series of the caudal vertebræ begins, which in form greatly resemble those of the New-Zealand *Epiodon*.

Ribs.

There are ten ribs on each side, of which seven have two articulations and the last three only one.

The first is the shortest of the whole series with the exception of the last; it is also the broadest.

There is scarcely a sign of an articular process for its articulation with the seventh cervical vertebra, and only a very slightly marked articular surface for the transverse process, both being indicated by a small indentation on the edge of the head of the rib. The second rib has the same flattened form as the first; it is longer, and both articulating processes are better-defined. From the second to the sixth rib, they gradually lengthen, after which they diminish again a little until we reach the tenth, which is the shortest of the whole series. The third, fourth, fifth, sixth, and seventh ribs have all well defined articulating processes and nearly the same form, flattened at and near their head, after which, for nearly one third of their total length, they become more constricted and assume a prismoid shape, after which they flatten and gain again in breadth, their terminal end being, however, narrower. The eighth and ninth ribs, which have only one articulating process for their junction with the transverse process, have the same form as the foregoing if we imagine their heads and necks removed. The tenth rib is flattened throughout; it has also only one articulating surface, and at its posterior end runs out to a point.

The greatest length of each rib, measured in a straight line, is:—

	feet.	inches.
First	1	2·75
Second	1	9·50
Third	2	1·60
Fourth	2	4·10
Fifth	2	4·25
Sixth	2	4·80
Seventh	2	4·60
Eighth	2	3·50
Ninth	2	3·03
Tenth		10·25

Sternum.

The sternum consists of four principal segments, of which the fourth and smallest is separated into a left and a right portion by a division in the centre, which apparently would not have disappeared by ankylosis in a still more aged state of the skeleton.

The first segment is the largest and broadest; it is without a keel, but is well rounded towards the central line. There is a deep excavation in its upper, and a shallower one in its lower portion. Similar excavations exist in the three other segments, by which three fenestra of a rounded shape are formed.

There are five articulating surfaces on each side for the sternal ribs—the first near the upper portion of the first segment, the second at the junction of the first and second segments, the third at the junction of the second and third segments, the fourth at the junction of the third and fourth segments, and the fifth at each side of the fourth segment on its lower portion.

Pectoral Limb.

The scapula is remarkably flat, and without prominent ridges, so that there is scarcely any sign of the postscapular fossa. In form it resembles that of *Mesoplodon sowerbiensis*. The acromion is broad, and has an upward slope in its anterior portion; the coracoid is flat and narrow, but widens considerably at its extremity, where it assumes a prismoid form.

The humerus, ulna, and radius resemble also considerably those of *M. sowerbiensis*. The epiphyses on both extremities are so well anchylosed that scarcely the line of junction can be traced.

The elements of the carpus are, with the exception of the magnum and trapezoid, which are united into one bone, all separate, thus resembling also *M. sowerbiensis* and the New-Zealand *Epiodon*. The same appears to be the case with the digits, which, however, have somewhat suffered, as the pectoral fin had been much lacerated before the skeleton was secured.

Pelvic Bone.

The pelvic bone for the attachment of the crura of the penis is of small size, and of rather irregular form. It is 4 inches long, 0·37 inch broad near both extremities, and 0·25 inch in the middle portion. It is rounded posteriorly and flat anteriorly, getting gradually flatter as we reach the lower end of the bone. It is very light and spongy.

4. Remarks upon Dr. von Haast's Communication on *Mesoplodon floweri*. By Professor Flower, F.R.S.

On comparing the excellent photograph sent by Dr. v. Haast of of the skull of this animal with the type specimen of *M. layardi*, from the Cape of Good Hope, in the British Museum, neither Professor Van Beneden nor myself could detect any differences of the slightest specific importance; indeed at first sight we were inclined to say that the photographs might have been taken from that very specimen. The latter, however, is a trifle larger in all its dimensions, being an inch and a quarter longer; and the teeth are rather more developed, probably the effect of somewhat greater age.

The distinctions upon which Dr. v. Haast relies are chiefly the result of the comparison of the skull with a small figure of *M. layardi* quite inadequate for the purpose, and disappear on more rigid examination. For instance, the proportion of the height to the length of the lower jaw, one of Dr. v. Haast's most telling characters, is really identical, instead of being so widely different as supposed. The habitats of the two specimens, instead of being a reason for separating, would rather, in my opinion, be one for uniting them, as there can be no possible barrier for a Cetacean between the seas of the Cape and those of New Zealand. I am therefore unable, upon the evidence before us, to accept *Mesoplodon floweri* as a well-established species. The great interest of the present communication is that it contains a description of the entire skeleton, and shows that it presents an exceedingly close resemblance to the well-known Northern form, *M. sowerbiensis*.

5. On *Mystacina tuberculata*.

By G. E. Dobson, M.A., M.B., F.L.S., &c.

[Received May 13, 1876.]

There are some important points in the external structure of that most remarkable species of Bat, *Mystacina tuberculata* of New Zealand, which have not yet been noticed, although one writer has occupied four closely printed pages of an octavo book in describing it.

In a paper by Mr. R. F. Tomes, in our 'Proceedings' for 1857, p. 139, a coloured lithograph of this species is given, showing the very peculiar structure of a portion of the wing- and interfemoral membrane near the body; and in the text accompanying it are the following remarks:—"The portions of membrane contiguous to the forearm, the sides of the body, and the tibia are very thick and leathery, with numerous deep wrinkles; and the basal half of the interfemoral membrane (as far as to where the tail becomes free) possesses the same peculiarity. The wrinkles, in many places, cross the legs and forearms, but they are only observable on the upper surfaces of the membranes and limbs. This singular part of the cutaneous system is marked by a regular and decided outline, and can scarcely be said at any place to graduate into the smooth (and very thin) membrane of the wings. Its extent is pretty well indicated by the hairy portions of the membranes in the genus *Lasiurus*, excepting that it only occupies one half of the interfemoral membrane."

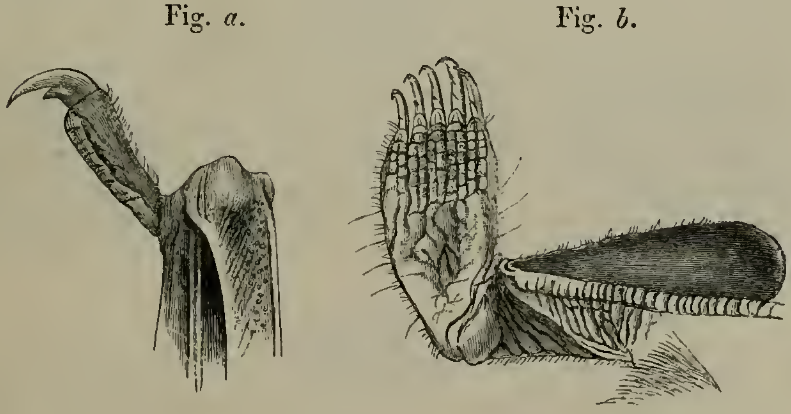
No conjectures are hazarded as to the use of this peculiarly thickened and differently coloured portion of membrane, which occurs in this species alone.

I find that this thickened portion of the wing-membrane is analogous to the thickened portion of the anterior wings in *Hemiptera* and to the elytra of the *Coleoptera*.

Among the many peculiarities of structure presented by *M. tuber-*

culata, none are more remarkable than the presence of a third phalanx in the middle finger, a character in which it differs from all other species of the family (Emballonuridæ) to which it belongs, and agrees with those of a distinct though allied family, the Phyllostomidæ, which are limited to America.

The middle finger consists of a metacarpal bone and three phalanges. The first phalanx, instead of being folded (in repose) upon the dorsal surface of the metacarpal bone (as in the other species of Emballonuridæ) is flexed downwards, inwards, and forwards upon the inferior surface of the metacarpal, carrying with it the corresponding phalanx of the third finger, which lies folded downwards and forwards, between it and the metacarpal bone; the second phalanx is folded backwards on the first; and the third phalanx is folded forwards on the second. Being thus reduced by this peculiar folding process into the smallest possible space, the wing is then tucked in beneath the thickened portion of the wing-membrane margining the forearm and side of the body, which sheaths and completely conceals the whole wing. The posterior half of the interfemoral membrane, from the point where the tail perforates it, is rolled upwards and forwards beneath the leathery anterior half. With the wing- and interfemoral membranes thus encased, this species is the most quadrupedal of Bats; and the peculiar development of the extremities, which I shall now describe, indicates special powers of progression.



Thumb and sole of foot of *Mystacina tuberculata.*

The thumb is long, and armed with a large and very acute claw, which has a small talon projecting from its concave surface near the base (fig. *a*); the feet have similarly long and very acute claws; and at the base of each a similar talon is placed (fig. *b*). This peculiar basal talon has not been before observed; and I believe it does not occur in any other species of known Bats. A similar talon is found at the base of the claws in the short-tailed Chameleon, *Rhampholeon spectrum*, which is thus described by Dr. Günther in his description of that species :—"The tail is so short that it can serve as a prehensile organ in a very subordinate manner only. This defect is compensated by the development of an additional sharp denticle at the inner base of each claw, and of a spine vertically projecting from the flexor side of each finger and toe, which must immensely strengthen the power of the animal for holding on to branches, &c." *

The posterior extremities are short, the legs very short and thick; and the outer and inner toes are shorter and much thicker than the others, as in *Nyctinomus*; but they are not fringed with long hairs. The feet are remarkably large, and much rotated outwards and forwards, so as to allow of easy progression. The structure of the sole of the foot and of the inferior surface of the leg is very peculiar, and is well shown in the accompanying woodcut (fig. *b*). The plantar surface, including the toes, is covered with soft and very lax integument, deeply wrinkled; and each toe is marked by a central longitudinal groove with short grooves at right angles to it, as in the genus *Hemidactylus* (Geckotidæ). The lax wrinkled integument covering the sole of the foot is continued along the inferior flattened surface of the ankle and leg.

All these peculiarities of structure must accompany some corresponding peculiarities in the habits of this species. As the denticle at the base of the claw in *Rampholeon spectrum* evidently compensates that animal for the shortness of its tail, which is so effective a prehensile organ in other Chameleons, so I have no doubt the denticle at the base of the claw in *Mystacina tuberculata* compensates that species exceptionally for the imperfect condition of the fore limbs as organs of prehension; and this, taken into consideration with the peculiar manner in which the wings are protected from injury when not employed in flying, and with the manifestly adhesive nature of the sole of the foot and inferior surface of the legs, lead me to believe that this species hunts for its insect food, not only in the air, but also on the branches and leaves of trees, among which its peculiarities of structure most probably enable it to walk about with security and ease.

6. Descriptions of five new Species of Land-Shells from Madagascar, New Guinea, Central Australia, and the Solomon Islands. By Henry Adams, F.L.S., and George French Angas, C.M.Z.S. & F.L.S.

[Received May 29, 1876.]

(Plate XLVII.)

Helix malantensis, n. sp. (Plate XLVII. figs. 1, 2, 3.)

Shell imperforate, trochiform, rather solid, faintly obliquely striated, whitish, ornamented with several broad or narrow fulvous or dark chestnut bands, brown at the base; spire turbinate; whorls

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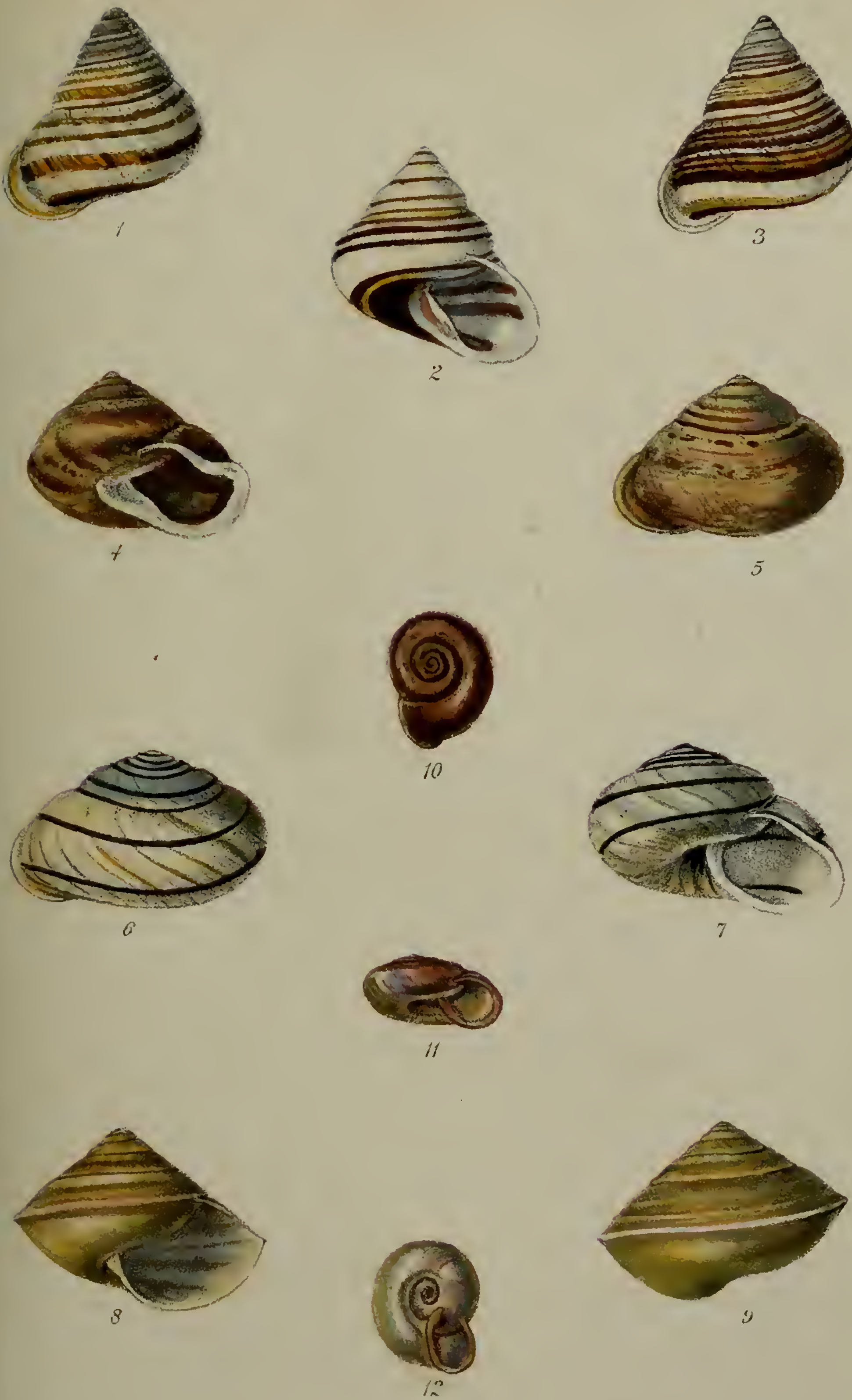
* P. Z. S. 1874, p. 443, with a woodcut.

P. Z. S. 1876. Pl. XLVII.



G.B.Sowerby lith.
Hanhart imp.

LAND SHELLS FROM NEW GUINEA,
MADAGASCAR, & AUSTRALIA.

BRITISH MUSEUM
NATURAL HISTORY

5½, rather convex, the last descending in front; aperture oblique, quadrately lunate; peristome white, margins converging, united by a faint callus, right margin slightly sinuous, a little expanded and reflexed, columellar margin dilated above and a little excavated.

Diam. maj. 25, min. 22, alt. 22 mill.

Hab. Malanta Islands, Solomon Archipelago.

This species differs from *H. guadalcanarensis*, Cox, in being more conical, in the last whorl being less inflated, descending in front, and not angled at the periphery, and in the aperture being smaller, and the outer lip much less flattened and expanded, as well as by the absence of the black margin at the angle of reflexion behind the outer lip, and the purple spot on the columella, and in having the base broadly stained and zoned with chestnut.

HELIX COMRIEI, n. sp. (Plate XLVII. figs. 4, 5.)

Shell imperforate, conically semiglobose, rather solid, rugosely spirally grooved, and obliquely finely striated, opaque, whitish; spire conoidal, obtuse; whorls 4½, rather convex, the last descending, subangulated at the periphery, somewhat flattened at the base, and a little excavated behind the aperture; aperture diagonal, oval-oblong, pale brown within, peristome white, margins converging, united by a thin callus, right margin sinuous, rather expanded and reflexed; columellar margin dilated and appressed.

Diam. maj. 27, min. 21, alt. 20 mill.

Hab. Shores of Huon Gulf, South-east New Guinea.

This interesting species is allied to *Helix brumeriensis*, Forbes, but is rather smaller in size, and without the characteristic black lip of the latter. It was discovered by Dr. Comrie, of H.M.S. 'Basilisk,' after whom we have named it. In the same locality Dr. Comrie obtained several specimens of *Helix brumeriensis*, hitherto known only by the single specimen in the British Museum, collected by the late Mr. J. McGillivray at Brumer Island, during the voyage of H.M.S. 'Rattlesnake,' in August 1849.

HELIX ROBILLARDI, n. sp. (Plate XLVII. figs. 6, 7.)

Shell umbilicated, orbicularly subglobose, rather solid, obliquely striated, whitish, with a pale brown shining epidermis, and ornamented with three very narrow dark brown bands, one being sutural; spire depressedly conical, apex obtuse; whorls 5, moderately convex, the last descending in front and somewhat flattened at the base; umbilicus open, funnel-shaped; aperture diagonal, truncately oval, pale brown within; peristome with margins approximating, united by a thin callus, the right margin slightly flexuous, expanded, and a little reflexed; the columellar margin thickened, reflexed, and dilated above.

Diam. maj. 32, min. 27, alt. 20 mill.

Hab. South-west Madagascar (*Coll. Sir D. Barclay*).

HELIX FENERIFFENSIS, n. sp. (Plate XLVII. figs. 8, 9.)

Shell narrowly umbilicated, depressedly trochiform, carinated, very thin, subpellucid, shining, pale olive-green, finely obliquely striated throughout and decussated above with very minute concentric rugose striæ: spire conical, apex obtuse; whorls 6, nearly flat, the last not descending in front, inflated below; aperture diagonal, large, angularly elliptic; peristome thin, simple; columellar margin slightly reflexed over the umbilicus.

Diam. maj. 33, min. 27, alt. 24 mill.

Hab. Feneriffa Islands, North-west Madagascar (*Coll. Sir D. Barclay*).

Helix eyrei, n. sp. (Plate XLVII. figs. 10–12.)

Shell widely umbilicated, subplanorbular, rather thin, obliquely striated, and under the lens minutely granulated, light brown, pale below; spire flattened; whorls 5, a little convex, the last rounded and slightly descending; aperture oblique, lunate; peristome flesh-coloured, margins approximating, thickened, and slightly expanded.

Diam. maj. 17, min. $14\frac{1}{2}$, alt. $6\frac{1}{2}$ mill.

Hab. Shores of Lake Eyre, Central Australia.

This is another species of the peculiar discoidal group of Helices (*Angasella*, A. Ad.) from the arid regions of Central Australia, to which *H. cyrtopleura*, Pfr. and *H. phillipsiana*, Ang., also belong.

EXPLANATION OF PLATE XLVII.

Figs. 1–3. *Helix malantensis.*
4, 5. —— *comriei.*
6, 7. —— *robillardi.*
8, 9. —— *feneriffensis.*
10–12. —— *eyrei.*

7. Notes on the Birds of the Navigators' and Friendly Islands, with some Additions to the Ornithology of Fiji. By E. L. Layard, C.M.G., F.Z.S., &c., H.B.M. Consul at New Caledonia.

[Received May 24, 1876.]

Recent visits to the Navigators' and Friendly archipelagos having enabled me to extend my knowledge of the avifauna of these two groups of islands, so intimately connected with the ornithology of Fiji, I offer the accompanying remarks for publication in the Proceedings of the Society as a sequel to my 'Notes on Fijian Birds' (P. Z. S. 1875, p. 423).

I will take first in order the Navigators', and give a list of the known species, commenting on them as I proceed.

1. Strix delicatula, Gould.

This Australian White Owl is common throughout the islands, and is the only Raptorial bird known on them. I frequently put it up from among the cotton-bushes planted in rows between the cocoa-nut trees; and it seemed not to be affected by the glare of the daylight. It feeds on lizards, beetles, &c.

2. Coriphilus fringillaceus, Gm.

Abundant in the early morning before the sun gets hot, on the flowers of the cocoa-nut trees, sipping the sweetened dew caught in the freshly opened spathes. When this is dried up by the heat, they are off to the forest, and feed on some of the many-petaled flowers of the tall trees. During the time that the "coral trees" (*Erythrinæ*) are in flower, they may be shot in dozens, as these trees form their favourite resort.

I have procured specimens of this lovely little Parrakeet from the island of Futuna; and they are very abundant on Vavaw, the most northern of the Friendly Islands.

3. Eudynamis taitensis, Sparrm.

I saw a single specimen of this Cuckoo in December, and was informed by a gentleman collecting for Messrs. Godeffroy, of Hamburg, that they are not uncommon.

4. Halcyon pealei, F. & H.,

is confined to the island of Tatuila, which, unfortunately, I was unable to visit. In Samoa it is replaced by

5. Halcyon recurvirostris, Lafr.

which is tolerably common in the more open parts of the forest, in the clearings and native gardens. It usually sits perched on a dead, protruding branch, on the look-out for insects (*Gryllæ*), after which I have seen it dart like a Flycatcher, hovering in the air and returning to its post of observation. It also darts at *Cicadæ* sitting on the trunks and branches of trees, off which it seizes them with unerring aim.

6. Collocalia spodiopygia, Peale.

One of the commonest birds in Samoa, skimming about the open country, or amid the cocoa-nut groves, with equal facility.

7. Myzomela nigriventris, Peale.

I did not find this lovely little "Sugar-bird" at all plentiful; those I saw were chiefly on the flowers of the Banana.

8. Ptilotis carunculata (Gm.).

Drs. Finsch and Hartlaub are, I think, in error in figuring this bird with a *white* iris, and describing it "iride alba." I have now shot a fair number in Loma Loma, in Samoa, in Tonga Tábu and Vavow; but in not one was there the least approach to a *white iris*; brown, or ashy brown was the colour in all of them. It is very common everywhere; and in the early morning, before sunrise, when the country rings with its loud notes, as a friend observed, "it is the nearest approach of any to a song-bird! he is trying to be a thrush!" It clings in any position to the flowers that conceal its favourite food (small insects), and is very pugnacious, driving away from the feast any bird that attempts to share it.

9. Leptornis samoënsis, Hombr.

Found in small flocks in the forests of Samoa, seldom approaching the coast, where, however, I was fortunate enough to meet with it and secure nice specimens. It has a loud flute-like call, and clambers about the topmost branches of the tallest forest trees. When held head downwards, a plentiful discharge of honey escapes from the bill, and the stomachs of those dissected contained insects, bits of leaves, &c.

10. Tatare longirostris (Gm.).

I sought for this bird in vain, both in Samoa and Tonga; and all my inquiries proved equally fruitless; no one knew of such a bird. The Rev. Mr. Whitmee also, who has devoted considerable attention to the zoology of the Navigators' Islands, doubts its being an inhabitant of them. It may have become extinct, like a species I shall have to allude to from Tonga; but the natives have no name for it.

11. Petroica pusilla, Peale.

This pretty little "Robin" is not very uncommon in the woods in Samoa, and is generally found in pairs, ♂ and ♀, or with the addition of their young family. It is bold and fearless, and admits of a close approach, being usually perched on the undergrowth of young trees. Feeds on small insects, ants, &c.

12. Turdus vanicorensis, Quoy.

This "Blackbird" might be easily mistaken for our English friend, both when hopping about the ground, probing for worms, or when speeding through the coppice, uttering its shrill metallic cry of alarm. Several times, when darting from some thick bush, it flew down the roads cut through the cocoa-nut plantation. When I saw it most abundantly, I could not help fancying myself again for the moment in some Staffordshire lane, where, as a boy, I chased them with loaded ash sticks!

I saw eggs in Mr. Whitmee's possession closely resembling those of the English bird, and gathered from him that the nest was also similar.

The acquisition of this bird revealed to me the fact that our Fiji bird is quite distinct, and of a new species, which I have therefore described under the title of *Turdus vitiensis*, Ann. N. H. 4 ser. vol. xvii. p. 305; and since I returned, the same kind friend to whom I am indebted for it has found another species in Taviuni, which I have had much pleasure in naming after him, *T. tempesti* (*anteà*, p. 420). This, with the Kandavu bird (*T. bicolor*, Ibis, 1876, p. 153), makes three species of this genus peculiar to Fiji; and I doubt not others yet remain to be found in the centre of the large island Viti Levu.

13. Rhipidura nebulosa, Peale.

Not rare in the forest, and about the cotton-bushes on the plantation before named. It did not spread its tail, or make such noisy demonstrations as the Fijian *R. albicollis*, perhaps because my visit to its haunts was not made during the breeding-season. I was informed that the nest was of the true *Rhipidura* type, with a long pendent base.

A fine *Rhipidura* has been added to the avifauna of Fiji, procured at Kandavu, by my old servant Charles Pearce. Mr. Ramsay, of the Sydney Museum, alludes to it as *R. personata*.

14. Myiagra albiventris, Peale.

This pretty little flycatcher takes the place, in Samoa, of the Fijian *M. castaneiventris*, but is not so plentiful; nor does it so much affect native villages and gardens, being more restricted to the forest. The sexes, unlike ours, are hardly distinguishable. A young bird (still tended by its parent) shot by me on the 18th December, almost exactly resembles the young of *M. castaneiventris* shot in October, being dark slate-coloured above, with a dirty buff throat, and whitish abdomen and vent.

This species feeds exclusively on insects, which it seeks on the leaves or on the wing, the snap of its bill being audible to a considerable distance.

15. Pachycephala flavifrons, Peale.

If the description given by Finsch and Hartlaub is correct, neither Mr. Whitmee nor myself have succeeded in identifying this species. The only *Pachycephala* known to us has certainly not got "*guttur album*." A fine male is *yellow* on the throat, slightly *dirtied* with a dark grey, which condenses to a near approach to black on the chin. The nostrils are covered by a yellow patch; but this is not noted in the description. A young male, shot on the 22nd December, has all the chin, throat, and chest grey, and shows traces of rufous on the flanks, vent, under tail-coverts underneath, and on the wing, secondaries, and cheeks above. It wants also the yellow nostril-patch. The female (unlike those of all the species known to me in Fiji, which are rufous) is also yellow below, the grey of the throat and chin being tinged with the same, no nostril-patch.

This bird is not uncommon in Samoa, and, in addition to the sexual difference noted before, is dissimilar to any *Pachycephala* I have yet seen, in its choice of locality, and want of voice. Our Fijian birds, (as also *P. jacquinoti* of Vavaw), never approach cultivation, but keep to the genuine forest; the Samoan species, on the contrary, comes down to the cocoa-nut groves and native gardens, and is a quiet bird, the others being constantly on the move, uttering their loud calls.

16. Pachycephala albifrons, Peale.

This bird did not occur to me; nor has Mr. Whitmee recognized it; indeed, *in epistolâ*, he entirely doubts the habitat.

I should here correct an error I have fallen into in my "Notes on

Fijian birds" (P. Z. S. 1875). The description under the head of *P. graëffei* (p. 433) applies to *P. icteroides*; and that under *P. vitiensis* should be coupled with the latter part of *P. torquata*, under the head of "*P. intermedia*, Layard, sp. nov."

P. icteroides, Peale, differs from *P. graëffei* in being of a much *lighter yellow* (the other is *orange*), and in having the nostril-spot much fainter; indeed in some it is altogether wanting. The female shows still greater differences: that of the first is deep rufous (almost chestnut); of the latter, brown with grey-mottled throat and pale buff underparts.

This species is said to occur in Samoa (Orn. Centr.-Pol. p. 76); and a native name, "Vasavasa," is given for it. This, however, is the name applied to the species before alluded to by me; and, as I have already stated, only one species is known to us from Samoa.

P. graëffei, Hartl., is, as far as I yet know, confined to the neighbourhood of Bua, on Vanua Levu; and a single female has reached me from Rambi Island, to the north of Taviuni.

P. intermedia, Layard, is intermediate between my *P. torquata* and *P. icteroides*, Peale. It is light-coloured, like the latter, and has only a *very narrow* black collar. It has been killed on Ovalau, and on the big island of Viti Levu opposite Ovalau.

P. vitiensis, G. R. Gray, ♂, has also a *narrow black* collar, but may at once be distinguished from all the others by the *pure white throat and chin*. The female is reddish brown below; cheeks chestnut; top of head brown, back tinged with green; quills brown edged with rufous. As yet it has only occurred to me from Kandavu, the southernmost island of the Fijian group.

17. LALAGE TERAT, Bodd.

Very common in Samoa, feeding much on the ground in the gardens attached to the European houses, as well as the native plantations. This habit I never observed in the Fijian bird, which appears to me less highly coloured than the Samoan. In December there were lots of young ones about, being fed by their parents. A most interesting specimen in this stage occurred to me: it is white beneath, with confused wavy grey bars, above pale brown, each feather being edged and tipped with white. Bill bright yellow.

18. APLONIS BREVIROSTRIS, Peale.

Common throughout the island of Samoa. Feeds much on a small dark purple berry that grows in dense clusters on a fair-sized tree. These birds decompose very quickly; I was always obliged to skin them the first on my return home, or all the vent-feathers came off.

19. STURNOIDES ATRIFUSCA, Peale.

It is singular this fine Starling should be confined to the Navigators' and not found in the Friendly Islands or Fiji. It was the first bird I saw on landing at Upolu, and involuntarily I exclaimed a "Spreo!" so exactly did its appearance, and flight, remind me of the South-

African *Lamprotornis bicolor*! It often goes in little flocks, and feeds much on the same trees frequented by the preceding, and also on a larger berry much patronized by the "Green Doves" (*Ptilonopus*). It also devours insects, and is subject to the same rapid decay as *A. brevirostris*.

20. Erythrura cyanovirens, Peale.

I obtained this pretty little Finch among the cotton-plants; but it was rare. It feeds on minute seeds. The young bird is furnished with small caruncles at the base of the bill, and has been made into a new genus by Drs. Finsch and Hartlaub, under the name of *Lobiospiza notablis* (P. Z. S. 1870, p. 817). The young of the Fijian bird (*E. pealei*, Hartl.) possesses similar appendages. My son has just procured it at Suva, on Viti Levu; and we got it in some plenty at Ngila, on Taviuni, in the forest, feeding on high trees bearing berries.

21. Ptilonopus perousei, Peale.

On one tree (a species of *Ficus*) in the forest at the back of Upolu, I saw at least thirty pairs of this lovely little Dove, in all stages of plumage, some of which I obtained.

22. Ptilonopus apicalis, Bp.

Mr. Whitmee (*in epistolâ*) informs me that the bird designated by this name is nothing more than the female of the preceding. Drs. Finsch and Hartlaub also, in their 'Ornithologie,' place a mark of doubt (?) before it. Great therefore was my astonishment when a live bird was brought on board H.M.S. 'Nymphe,' which I at once detected was quite distinct from our Fijian bird, and agreed very well with the description in the 'Ornithologie' of *P. apicalis*. Subsequently I obtained the loan of the 'Journal des Mus. Godeffroy.' In Heft 1, Tafel 7. No. 2 professes to be a figure of *P. fasciatus*, but has evidently been taken from a Samoan bird, and consequently represents *P. apicalis*. The deep orange of the vent and under tail-coverts, (so different from the pale yellow of the Fijian *P. fasciatus*), is well shown, as is also the bright yellow tip to the tail. This in *P. fasciatus* is dull grey, and does not extend to the end, the extreme tip being *green*. The chestnut on the abdomen (*entirely wanting in the Fijian bird*) is hardly dark enough, or bright enough; and the black indistinct line which exists at the superior edge of the same is not given; nor is the pale yellow patch from the chin along the centre of the throat. The magenta colour of the head is not dark enough; but this is clearly a mistake of the colorist. Another marked difference remains to be noted, the lovely *blue-green tips* to the wing-secondaries of *P. fasciatus* are changed in the Samoan bird to a still more lovely bright lilac! and the blue-black patch on the abdomen of the former is changed into an exquisite dark magenta. I now fancy the figure, pl. xi. of the 'Ornithologie,' must have been taken from a Samoan bird (see *antè*, p. 436).

I found *P. apicalis* abundant, feeding on various wild berries, some even on the low cotton-bushes, the voice a pleasing melancholy rolling coo, like that of its Fijian congener. Many young birds, assuming the magenta head, were obtained; the females are not so brightly coloured as the males, especially on the under tail-coverts; very young birds have the whole of the underparts "scaly" (maillé) with yellow edges to their green feathers; the wing-feathers are also broadly edged and tipped with fine yellow. They show no trace of the V-shaped termination of the breast-feathers, one of the characteristics of the genus; nor is the apical termination of the first primary so attenuated.

23. Columba vitiensis, Quoy.

A mutilated specimen brought me by a native appeared to be similar to our Fijian bird; and Mr. Whitmee informed me that he believed

24. Columba castaneiceps, Peale,

to be founded on the young of this species. They are not common.

25. Carpophaga pacifica, Gm.

Very abundant, and the sexual organs and knob on the bill of the male much developed in December.

26. Phlogœnas stairi, Gray.

Rare; only one specimen fell under my notice. Mr. Krause (Messrs. Godeffroy's collector) told me they had periodical migrations, and were sometimes plentiful. This bird is said to nest on the ground.

27. Didunculus strigirostris, Jard.

I did not myself see this bird in its haunts; but one was shot not far from where I happened to be, and I had the pleasure of skinning it. I had a native out in search of these birds for three days; but he failed to obtain any.

28. Megapodius stairi, Gray.

Mr. Whitmee and Mr. Krause both assured me no Megapode exists in the Navigators' Islands. Mr. Whitmee affirmed that the bird on which the species was founded was brought from Ninafoo by the Rev. W. Stair, and transmitted to England among some Samoan skins; hence the mistake. When I recollect that my late old friend Mr. G. R. Gray fathered on me the habitat of Ceylon for *Larus hemprichii*, because I gave the British Museum specimens shot at Aden on my way from the former place (among a number of Ceylonese birds), I don't wonder at the mistake!

29. Rallus pectoralis, Less.

Very abundant, running about wet places like rats, and preferring to trust for safety to their heels rather than their wings.

30. Ortygometra quadristrigata, Horsf.

31. O. tabuensis, Gm.

Neither of these birds occurred to me; but I heard that the latter was not uncommon. The former has been obtained in some abundance in the interior of Viti Levu, where it seems to displace the smaller *O. tabuensis*. Eggs said to be of this species are pale drab colour, profusely covered with reddish-brown ill-defined minute marks; axis 1″ 2‴, diam. 11‴. Six in one nest.

32. Porphyrio vitiensis, Peale.

How the mistake could have occurred of identifying the Samoan with the Indian bird, I cannot conceive. A comparison of the two must instantly dispel the illusion. This Gallinule is very common here as in Fiji and Tonga.

33. Limosa uropygialis, Gould.

Generally distributed, with the next species, along the sea-coast; but I could not hear of its being found in the breeding-plumage.

34. Actitis incana, Gm.

Not very plentiful where I was, but always obtainable at low tide.

35. Charadrius fulvus, Gm.

Very common, and tame, feeding on the grassy paddocks close up to the houses.

36. Strepsilas interpres, L., non vidi.

37. Ardea sacra, Gm.

Not common, but generally distributed.

38. Anas superciliosa, Gm.

Rare and local, being only found on the lakes in the mountains—old extinct craters, in fact.

39. Sterna bergii, Licht.

Little or nothing appears to be known about the sea-fowl of this group. Drs. Finsch and Hartlaub do not enumerate one single Tern from here! I recognized *S. bergii*.

40. Sterna melanauchen.

41. Sterna panaya.

42. Anous stolidus.

43. Anous leucocapillus.

44. Gygis alba, Sparrm.

Of these five Terns, the first I obtained in full breeding-dress and *στοργὴ* at Levuka in the end of January; the second my son shot in some plenty on the reef opposite Levuka in November, in splendid plumage, the whole body being suffused with such a pink blush as the loveliest woman in the world would covet for her cheek; the fifth must also be added to the Fijian fauna, as it is found among the islands to windward. I had often, in my cruises, noticed a large "Noddy," but only obtained it lately on my return from Samoa, when one was thrown on board, off Vatoa (Turtle-Island), during a hurricane, into which I was unfortunate enough to stumble. But "it is an ill wind that blows nobody luck;" it gave me *A. stolidus*, and very nearly a splendid specimen of *A. leucocapillus*; so these two must now certainly be included in the Fijian lists.

45. **Thalassidroma lineata**, Peale.

I saw a small petrel off Upolima, which was doubtless this species; also a large dark petrel which I fancied must be

46. **Procellaria cærulea**,

or what serves for it in these seas.

47. **Procellaria** —— ?

Just before my arrival a native had caught, in his workshop, a large Petrel, which he brought to Mr. Whitmee. I could not identify it, not having any descriptions; it however reminded me of *P. macroptera*, Smith.

My Notes on Fijian Birds must here be amended. *P. cerulæa*, as described by Drs. Finsch and Hartlaub, is found breeding in the mountainous parts of severul of the Fijian Islands, even as far inland as the interior of Viti Levu. It sweeps the seas in storm or calm, in company with the next and another larger species of *Procellaria*, not yet obtained, probably No. 47. *Puffinus nugax* also breeds in the interior, both digging holes and living in "rookeries." I have obtained specimens of both, and can only say that *P. cærulea* differs much from what we identified with *P. cærulea* at the Cape.

48. **Phaëton rubricauda**, Bodd.

49. **Phaëton æthereus**, L.

50. **Phaëton candidus**, Gray.

These three Tropic birds are found among the Navigators' Islands. The last builds in the forests of Samoa, selecting as a site for its nest the fork of a tree or of a huge perpendicular branch, so that it can enter at one side and avoid bending or damaging its long tail! I used to watch the flocks going to their sleeping-quarters in the woods passing high overhead; and we soon observed that great numbers of them were devoid of tails; one I obtained proved to have moulted this appendage.

51. **Dysporus sula**, L.

I saw "Gannets" about the Samoan seas, but not near enough to distinguish the species. This species is given as an inhabitant by Drs. Finsch and Hartlaub.

52. Tachypetes aquilus, L.

Common in stormy weather.

Though the number of species is smaller in the Navigators' Islands than in Fiji, being 52 as compared with 98, the number of individuals is apparently far greater. I could any morning, within one mile of the town of Upolu, shoot twenty or thirty birds, of at least ten species, in the course of a couple of hours. Here in Fiji, in the best collecting-ground, we considered eighteen or twenty specimens a good day's work, from daylight till one or two o'clock; and we might perhaps have six species, if we were lucky!

We were in Samoa at the worst time of the year, the rainy season: all the birds were moulting; and the young of the last season had not assumed their full nuptial dress. Mr. Krause assured me I could have obtained double or treble the number in the fine season, especially when the *Erythrina* blossomed. Its flowers are a great attraction to insects, and consequently to most of the birds.

I fancy that there are still other species to be discovered in the group. Dr. Gräffe does not seem to have been an assiduous collector, or he could not have missed so many novelties in Fiji. Perhaps Mr. Kleinsmith, the present collector for Messrs. Godeffroy, may prove more industrious; he has already done good service by discovering the curious little *Lamprolia minor*, and procuring additional examples of my new species.

On the 12th of February I found myself in Tonga-Tabu; and as soon as I could spare time from my official work (the object of my visit) I took a stroll in the country to inspect the birds of that part of my consulate. Few and far between were they. The little *Collocalia*, as usual, thrust himself first into notice; and I eagerly scanned them as they glided by to detect *C. vanicorensis*, but in vain. Then the "Wattle-birds" (*Ptilotis*) claimed my attention; and I fear I shot more than I could skin, to look for one with a *white eye*; none showed that peculiarity. Then *Lalage terat* appeared on the scene in considerable numbers. I was surprised at this, as it is not included in Drs. Finsch and Hartlaub's list. The last bird I shot was *Aplonis tabuensis*; and the instant I picked it up I saw that our Fiji bird differed from it, and had been wrongly associated with it. If, then, none of the synonyms given to *A. tabuensis* can be traced to a Fijian-killed bird, I propose for our species the name of *A. vitiensis*; and the bird I have described from the island of Futuna being identical with the Tongan species, the name given to it by me must sink into another synonym of that already overburdened species.

To proceed symmetrically, however, I commence with

1. Haliaëtus leucogaster, Gm. (?)

A solitary specimen of this bird may have reached Tonga; but all my inquiries respecting Raptorial birds only elicited the fact that our two Fijian hawks occasionally visit the group, and are recognized as stragglers by the Tongans, who of course, knowing them well, call them "Fiji Hawks." Some of the white residents were also aware of their occasional presence; I therefore include them in the Tongan list, provisionally, with a mark of doubt.

2. ? Astur cruentus, Gould.

3. ? Circus assimilis, Jard.

Occasional visitants. This reminds me that a straggler has turned up in Fiji, and must be added to our list. It was shot on the Rewa by Mr. Storck, and has passed into the possession of Baron von Hügel, who, I believe, identifies it as *Falco lunatus.* I have not seen it.

4. Strix delicatula, Gould.

The only resident bird of prey in this group. Common everywhere.

5. Platycercus tabuensis, Gml.

In answer to my inquiries after birds, I was always comforted with, "Ah! you should get the black parrot of Eooa!" and I confess my curiosity was greatly excited. However, as I was bound to Eooa on duty, I confidently expected to get it, and charged all my messmates in H.M.S. 'Nymphe' to shoot every parrot they could see!

This Eooa (or E-u-a) is a small island to the south of Tonga Tabu. It appears to me to be a mass of coral, metamorphosed, by the action of volcanic heat under great pressure, into crystallized limestone. It has then been raised to a considerable height (compared with Tonga Tabu its near neighbour) above the sea-level, and, having cracked in cooling, is traversed by numerous deep perpendicular fissures. In these flourish a luxuriant tropical vegetation, while the gently rising surface of the island itself is covered with rich grass, on which are depastured some ten or fifteen thousand sheep. As the forest has encroached in places on the pasture-land, the island, viewed from the higher levels, appears like a most beautiful park, and it has the reputation of being the "loveliest island in the South Seas."

I had to visit one of the stations; so, arming myself with "Long Tom," and handing my large double "Westly Richards" to a native, I sallied out, determined to get a "black parrot" if possible. I also specially hired a native to go in search of them, and shoot nothing else.

In one of the deep fissures I heard the undoubted "ka ka" of a parrot, that sounded vastly like that of our Fijian bird; so, while I kept watch for a flying shot, I sent the native down the perpendicular sides. Presently I heard below me the loud report of my big "ten-bore," followed by the native's shout of triumph; and he shortly reappeared, bringing me my old friend *Platycercus tabuensis.*

Here, then, was a surprise! the "black" parrot turns out a dark maroon; and here, on this speck of land, and *only on it,* appears a Fijian Parrot!! The more I think over it, the more I am convinced that the bird has been introduced into Eooa *artificially.* I have already (Ibis, 1876) described the varieties of this species and *Pl. splendens,* Peale. It will be seen that *Pl. tabuensis* and its allies inhabit that part of Fiji to which the Tongans have long years ago had free access. They and the Samoans are specially partial to red feathers for trimming their fans, &c., and for this purpose keep our little *Lorius solitarius* in confinement, plucking it twice a year. I was told they fetched as high as 20 or 30 dollars a pair in Tonga, to which place, and to Samoa, they are conveyed by every canoe or vessel that leaves these islands. What more likely, then, that some Tongan (a chief probably) took with him the form of *P. tabuensis* found in Vanua Levu, and either purposely or accidentally let it loose in Eooa? It could never fly thither of its own accord; its powers are too limited; and not one representative of the genus is found anywhere among the islands. No! it must have been introduced*.

At Vavaw I heard of a "small parrot with two long feathers in its tail" which formerly existed in the group, but has become quite extinct.

6. CORIPHILUS FRINGILLACEUS, Gm.

This lovely little bird is very abundant on Eooa and Vavaw, but is rare on Tonga Tábu; at least so said the Missionaries. Native name "Kohanga."

7. EUDYNAMIS TAITIENSIS, Sparrm.

I could hear nothing of such a bird; but it probably exists there.

8. HALCYON SACRA, Gm.

9. H. VENERATA, Gm.

I shot a whole lot of Kingfishers to find *H. venerata,* but, I fear, without succeeding in my object. I however observed that the bills in the Tongan birds were shorter than ours, and that full-plumaged males never assumed the fine chestnut colours of our bird.

10. COLLOCALIA VANICORENSIS, Quoy.

11. C. SPODIOPYGIA, Peale.

The latter is very common; the former I could not detect.

12. PTILOTIS CARUNCULATA, Gm.

The commonest bird in the group, native name "Fule-haio."

13. TATARE LONGIROSTRIS, Gm.

No such bird known to any one in the group, and no native name for it. Has it too become extinct?

14. MONARCHA NIGRA, Sparrm.

This bird has undoubtedly become extinct. Large sums have been offered by Messrs. Godeffroy's collectors for the acquisition of a single specimen, but in vain! The *very* old natives say they remember the bird, and call it "Moho."

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* Cf. Sclater, *suprà,* p. 308.—ED.

15. Pachycephala jacquinoti, Bp.

This fine Flycatcher is found only on Vavaw, and confines itself to the forest, wherein its loud call betrays its presence to the ear, though it seldom meets the sight, unless cautiously sought for. I could call them to me by imitating the note, and obtained three adult males, three young males, and three adult females. The assistant-surgeon, also, of the ship, who has begun collecting birds, obtained a pair of adult birds, male and female, the morning of our departure. Its call is not unlike that of *P. torquata*, ending with a short, snapping note. The females, unlike those of our Fijian *Pachycephalæ*, are clear yellow below, with a buff-coloured head, throat, and chest. They frequented the high timber as well as the undergrowth, searching for minute insects, at which they darted while at rest on the underside of leaves or branches; native name "Kho." As an addition to the fauna of Fiji, I give descriptions of the egg and nest of *P. torquata* obtained by Mr. Tempest in Taviuni.

Egg palish blue-green, densely spotted with large black spots, in the form of a ring, at the obtuse end, and sparsely over the rest of the surface. Axis 1″ 2‴, diam. 9‴.

Nest, a coarse structure of rootlets, covered with dead leaves, fastened with spiders' webs, placed in a bush on a thin twig, and supported by a horizontal branch of dead wood, evidently placed for the purpose. External diam. 4″, internal 2½″; internal depth 2″.

16. Lalage terat, Bodd.

Sigīviu of the natives. I obtained an egg of this bird from a little English lad on Eooa. It is pale blue, sparsely but generally spotted with dark purple-brown spots, rather large. Axis 1″ 2‴, diam. 9‴.

17. Aplonis tabuensis, Gm.

As before stated the true *A. tabuensis* differs from our Fijian bird, which is much lighter below, with the white markings down the shaft of each feather much broader and more developed, and the light chestnut of the belly and under tail-coverts brighter and clearer; over the whole of the upper plumage likewise, especially on the head, there is a fine *coppery* glance, which, in the Tongan bird, is changed to an *iron* glance. It is not such a robust bird; and the bill is decidedly smaller. I propose for it the name of *A. vitiensis*. The Tongan bird is found on Futuna Island.

18. Ptilonopus perousei, Peale.

A rare visitant to the Tonga group. I did not see it.

19. Ptilonopus porphyraceus, Forst.

This "green dove" is not uncommon, and is decidedly intermediate between our *P. fasciatus* and the Samoan *P. apicalis*. It has the orange under tail-coverts of the latter, but wants the dark chestnut marking on the abdomen, being here more like the former. A fine breeding male has the black abdominal patch shaded away into brilliant purple. The spots on the secondaries also resemble in colour those of *P. fasciatus*. A *Ptilonopus* from Futuna Island agrees precisely with this bird.

In habits it resembles its brethren, and is called by the natives "Kullu Kullu." A female in full breeding-plumage resembles the male, but is not so brilliantly coloured on the abdomen.

20. CARPOPHAGA PACIFICA, Gm.

Common throughout the group; native name "Oroobe."

21. MEGAPODIUS BURNABYI, Gray.

No Megapode is found in the group, according to the testimony of the whites, who, however, know the Ninafoo bird well.

22. PORPHYRIO VITIENSIS, Peale.

Though not given as an inhabitant of these islands by Drs. Finsch and Hartlaub, I obtained this species (or saw it) on Tongatabu, Eooa, and Vavaw.

23. LIMOSA UROPYGIALIS, Gould.

Was shot by our party, both on Eooa and Tongatabu.

24. ACTITIS INCANA, Gm.

Same as preceding.

25. CHARADRIUS FULVUS, Gm.

Very common, especially on the uplands of Eooa.

26. STREPSILAS INTERPRES, L.

Not mentioned by Drs. Finsch and Hartlaub, but very common. I saw a large flock of at least forty, showing all stages of plumage; one I shot was just assuming the nuptial dress.

27. ARDEA SACRA, Gm.

Very common, most of those shot were just assuming the full white plumage, a few blue feathers appearing here and there.

28. ANAS SUPERCILIOSA, Gm.

Common both on the sea-shore and in the lagoons.

29. STERNA GRACILIS, Gould.

Given by Drs. Finsch and Hartlaub as found in Tongatabu. The species we saw were:—

30. STERNA BERGII, Licht.

31. STERNA MELANAUCHEN, Temm.

32. Sterna panaya, Gm.

These were all common in the harbour at Tongatabu, the last being in specially fine plumage.

33. Gygis alba, Sparrm.

A few of these were killed on Tongatabu; but on arriving at Eooa I found the ravines full of them, and so tame that they would almost perch on the gun-barrel, if it was held out. The officers of the ship made the same observation on their tameness at a lagoon in Vavaw. They perch constantly on trees; but for what purpose I could not ascertain; the stomachs of six I shot were entirely empty. The lovely blue tints at the base of the bill fade soon after death.

34. Anous stolidus, L.

35. Anous leucocapillus, Gould.

The former I saw at sea, off the islands; the latter was common even in the harbour. Petrels were also seen.

36. Phaëton rubricauda, Bodd.

37. Phaëton æthereus, L.

38. Phaëton candidus, Gray.

All the *Phaëtontes* were observed about the islands. At Eooa I obtained an egg, said to be of the latter, which is called by the natives "Tavaki."

39. Dysporus piscator, L.

40. Dysporus sula, L.

41. Tachypetes aquilus, L.

Gannets were seen from the ship when near land, but none obtained. Frigate-birds hovered over our mast-heads, and tempted Captain Suttie to two or three shots, in the hope of procuring me a specimen; but their small bodies, at the great altitude they always maintained, escaped the shot.

These seas, as a rule, are very destitute of birds. If any are seen, it is a sure indication that land is not far off. The "Frigates" and "Phaëtons" approach the ship, while the "Noddies," "Petrels," and "Puffins" keep at a respectful distance, and can only be identified through my faithful companions my binoculars. A little practice enables one to do this with tolerable certainty; there is sure to be some marked peculiarity by which, if the bird is once fairly identified, it can always afterwards be recognized.

Carefully made collections from each of the numerous small islands dotted over these seas would, I am convinced, exhibit some interesting facts in the distribution and variation of species. The volcanic islands especially would afford a fine field for scientific investigation, in connexion with the distribution of the Megapodes, as they seem to be confined, more or less, to them.

Captain Suttie informed me that on Savo (Solomon Islands) he found the sea-shore divided into "paddocks" by stone walls, having no enclosure at the back, which led into the bush. These belonged each to an individual, or a family; and no one poached on his neighbour's ground. The Megapodes came down to the beach to lay their eggs in the sand, merely scratching a hole like that of a rabbit, and leaving it open after them. All eggs found in these enclosures belonged to the owner of the plot of ground. The birds *made no nest, or mound, of any sort.* Captain Suttie took some eggs on board; and they hatched in a box in his cabin! They fed on minute insects which they found in the sand brought on board with them, which they turned over continually; when these failed they died.

I have to make the following additional emendations on my "Notes on Fijian Birds" (*anteà*, p. 423 *et seq.*).

A new Parrakeet must be added to the list, TRICHOGLOSSUS AUREOCINCTUS, mihi, found in various places, chiefly Taviuni, Viti Levu, and Ovalau.

EUDYNAMIS TAITIENSIS, Sparrm.

My son and I obtained this Cuckoo on Wakaia, and saw several specimens, in the middle of September last.

HALCYON CASSINI, F. & H.

I cannot satisfy myself of the distinctness of this species from *H. sacra.* I do not think more than one form of *Halcyon* is found in Fiji; but they differ much at different ages; the sexes also differ.

PTILOTIS PROVOCATOR, Layard.

The egg is pale salmon-colour, generally speckled, but chiefly at the obtuse end, with largish spots of dark brown and indistinct purple. Axis 1″, diam. $1\frac{1}{2}$‴.

TURDUS VANICORENSIS, Quoy et Gaim.,

has not been found in Fiji. We however, possess three true "Blackbirds":—*T. bicolor*, Layard, from Kandavu; *T. vitiensis*, Layard, from Bua; and *T. tempesti*, Layard, from Taviuni. I expect others will turn up in Viti Levu.

ORTYGOMETRA QUADRISTRIGATA, Horsf.

Inhabits the mountainous interior of Viti Levu.

STREPSILAS INTERPRES, Linn.

Shot on Koro by my son.

STERNA MELANAUCHEN, Temm.

Several have been shot by my son, on the reef at Levuka.

Puffinus nugax (Solander).

Procellaria cærulea, Gm.

Both species breed in the mountainous parts of the islands; and my son obtained a specimen of the former, swimming ou the Rewa river.

Phaëton æthereus, L.

Phaëton rubricauda, Bodd..

Phaëton candidus, Gray.

I have positively identified these three *Phaetontes* as inhabitants of these islands.

Diomedea melanophrys.

Baron von Hügel testifies that he saw this bird within sight of Kandavu; it may therefore claim a place in our avifauna.

8. On some Anatomical Characters which bear upon the Major Divisions of the Passerine Birds.—Part I. By A. H. Garrod, M.A., F.Z.S., Prosector to the Society.

[Received May 17, 1876.]

(Plates XLVIII.-LIII.)

A special analysis of the peculiarities of structure presented by different Passerine birds can hardly be considered premature. Since the investigations of Nitzsch, Sundevall, Keyserling and Blasius, Johannes Müller, and Cabanis little of decided importance has been made out with reference to the distinguishing characters of the group or of its primary divisions, if we except the researches of Professors Huxley and Parker on the palate in the class Aves generally. A glance at the history of the Order will be the best introduction which I can offer to the facts which it is my desire upon the present occasion to bring before the Society.

Although the name "Passeres" was coined by Linnæus, that illustrious naturalist did not appreciate the unity of the group, his classification compelling him to include the Columbæ in the order, which was defined as having "rostrum conico-attenuatum," and *Paradisea, Corvus,* together with *Certhia* among the "Picæ," "rostro superne compresso convexo."

Cuvier, in 1798 *, made a great step in advance by forming an order "Passeres" to include all those now so called, together with those non-swimming, non-wading, non-climbing, non-raptorial, non-gallinaceous birds in which there are not two toes of the foot retroverted.

Nitzsch † was the first to appreciate the true limits of the order, when in 1829 he grouped together the birds now termed Passeres in a single section, entirely by themselves.

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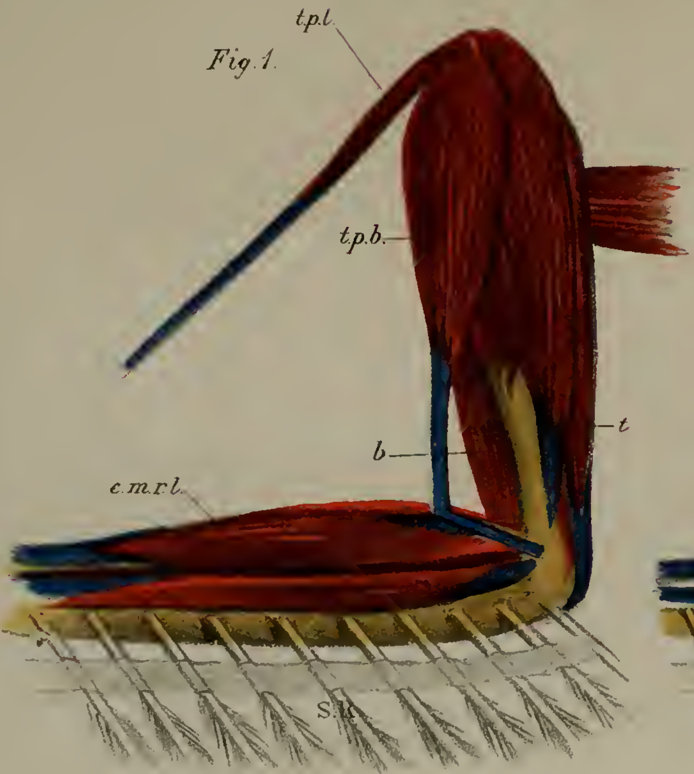
* Tableau Elémentaire, p. 199 *et seq.*

† Observationes de Avium arteriâ carotide communi.

Fig. 1.



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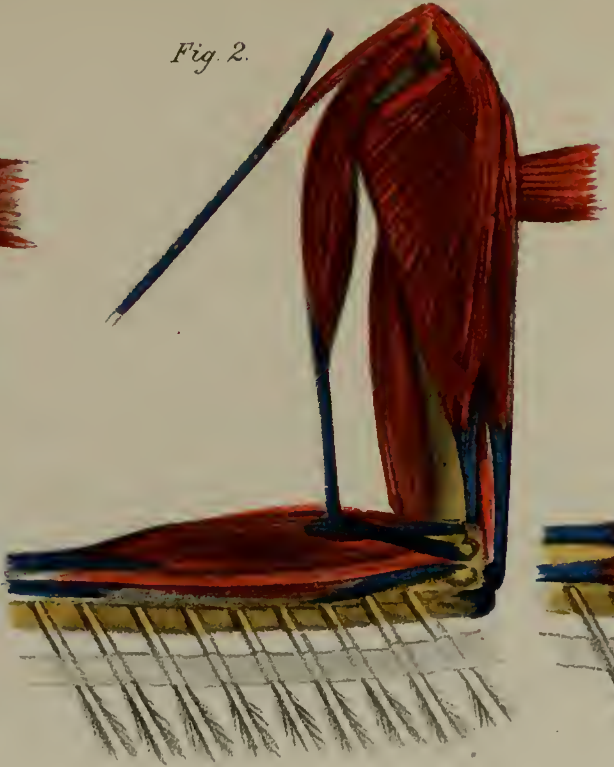

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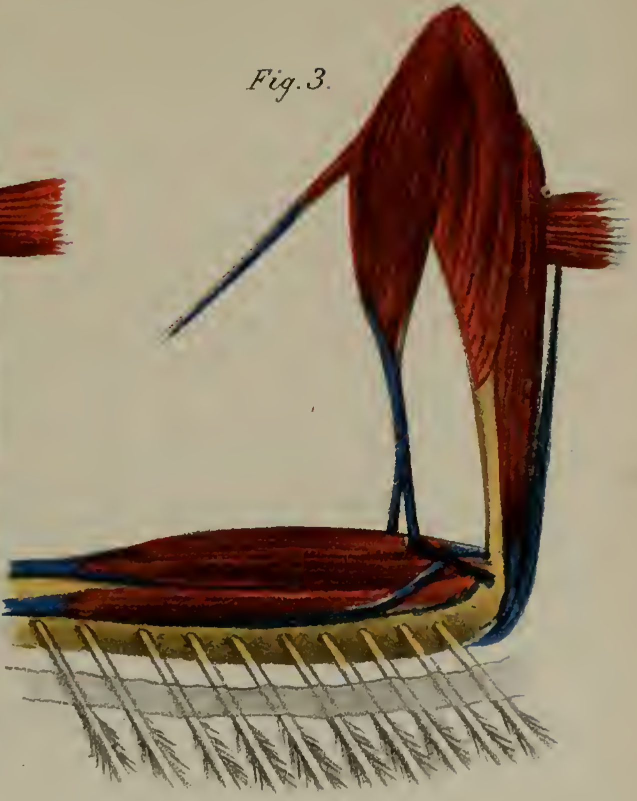

J Smit lith

Hanhart imp

ANATOMY OF PASSERINE BIRDS

BRITISH MUSEUM
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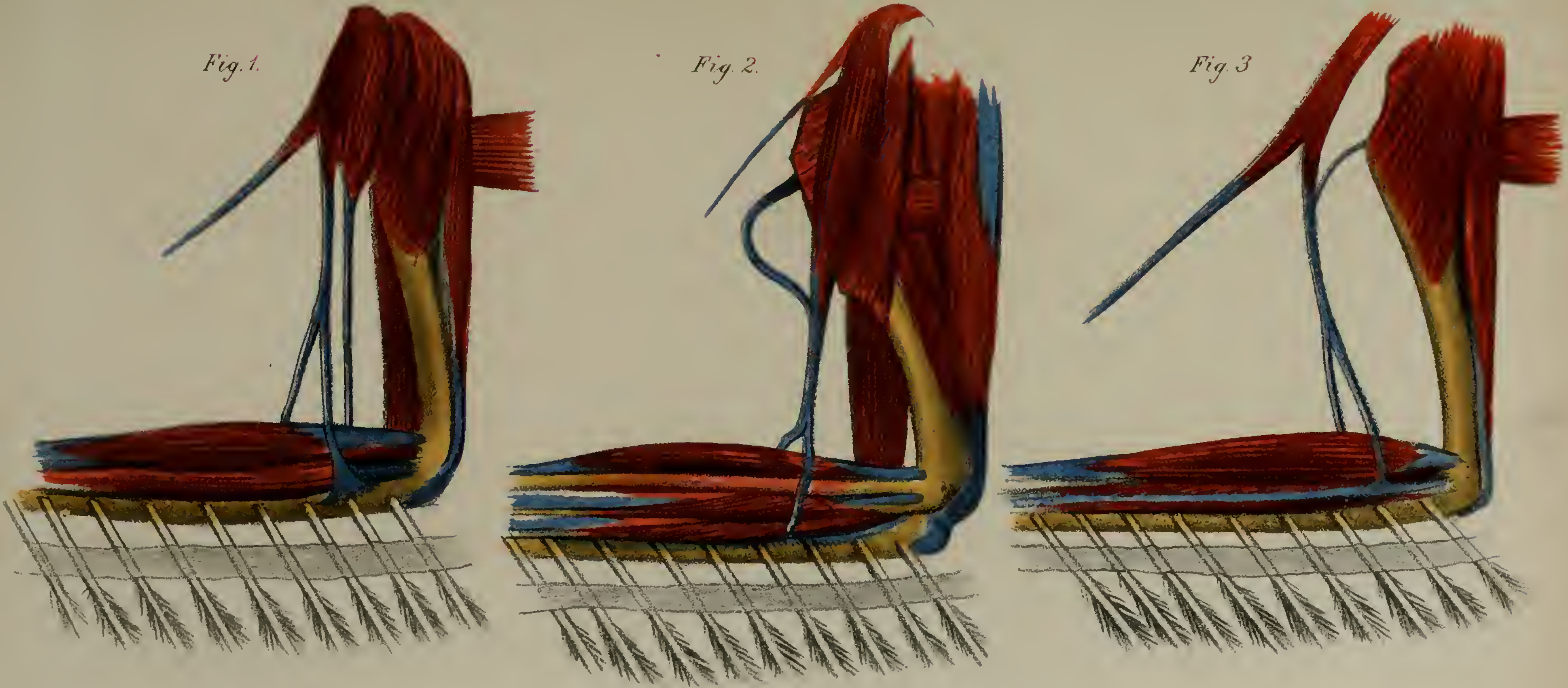
NATURAL HISTORY



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ANATOMY OF PASSERINE BIRDS

BRITISH MUSEUM
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NATURAL HISTORY

Fig. 1

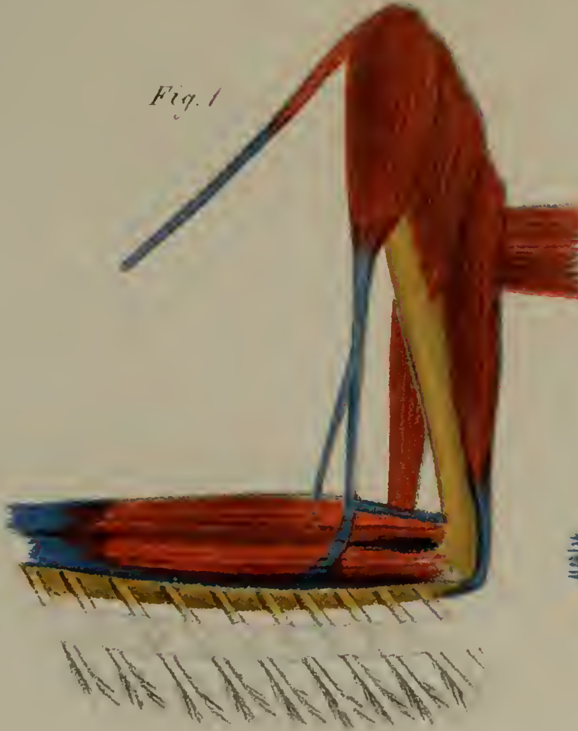
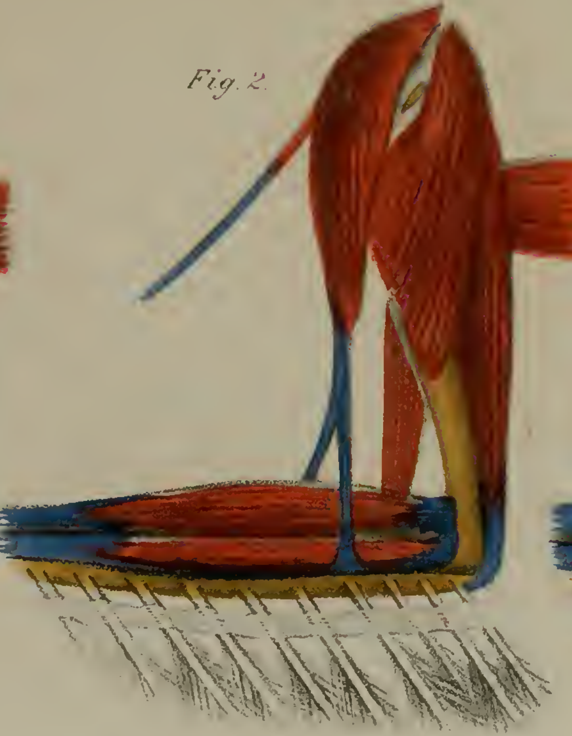


Fig. 2



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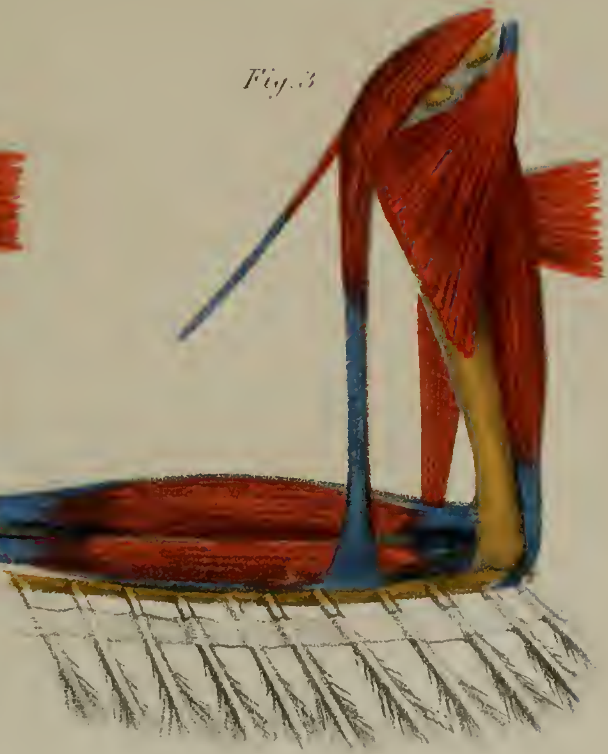


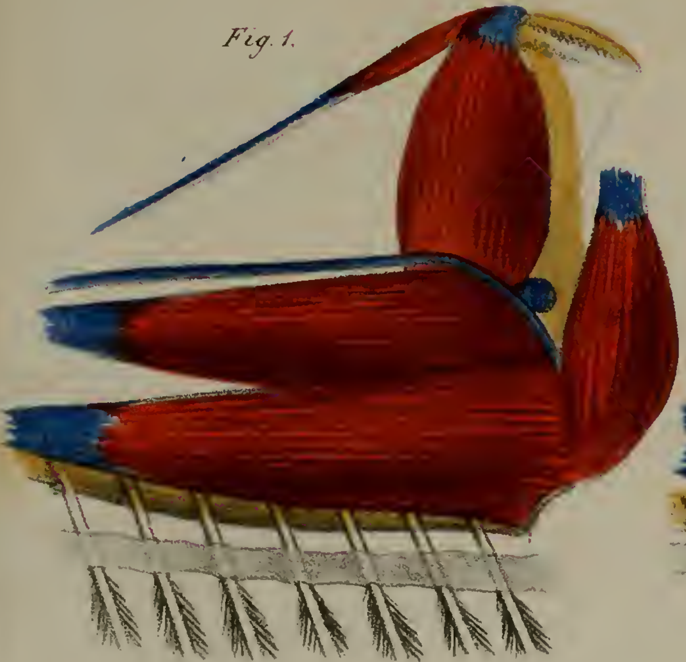
J. Smit lith.

Hanhart imp.

ANATOMY OF PASSERINE BIRDS

BRITISH MUSEUM
Z D
NATURAL HISTORY

Fig. 1.



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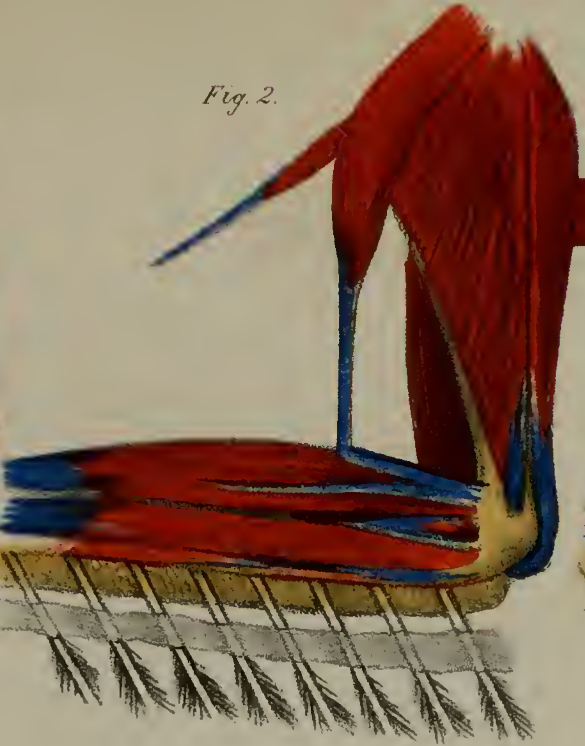

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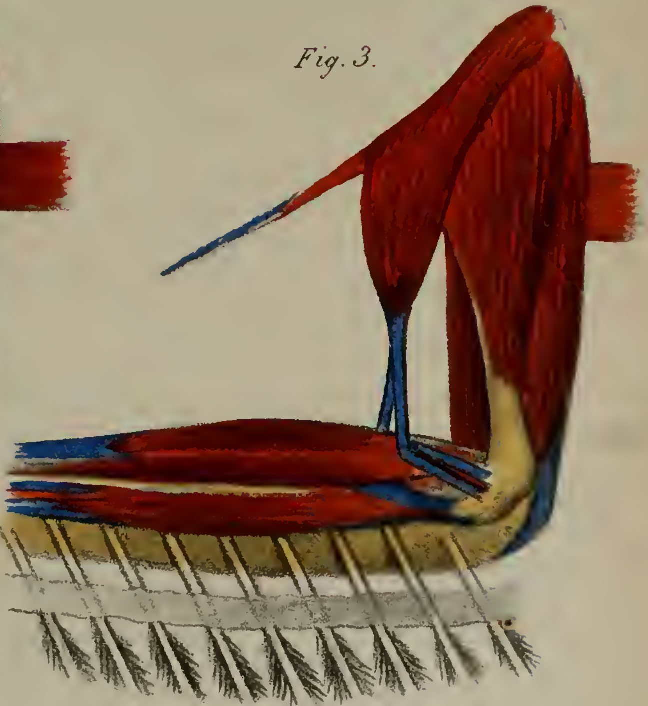

J.Smit lith.

Hanhart imp

ANATOMY OF PASSERINE BIRDS

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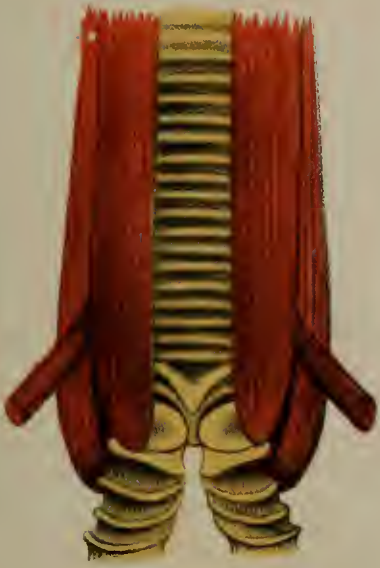
NATURAL HISTORY

Fig. 1.



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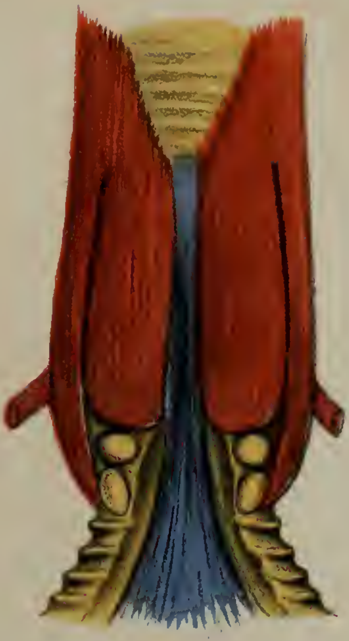

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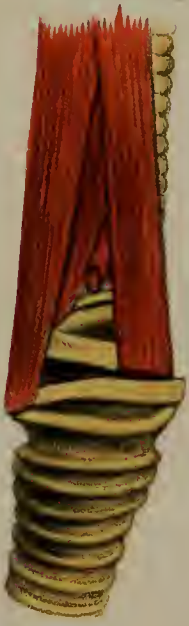

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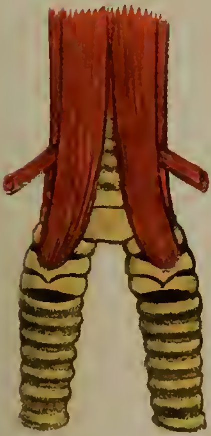

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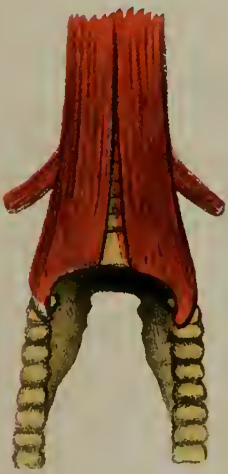

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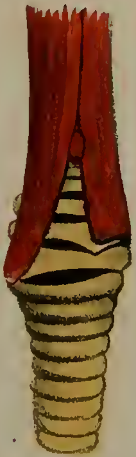

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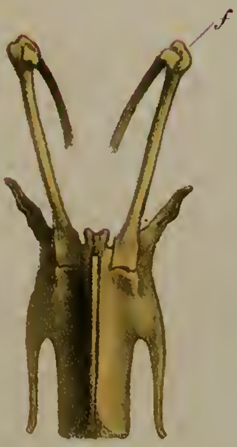

J. Smit lith.

Hanhart imp

ANATOMY OF PASSERINE BIRDS.

BRITISH MUSEUM
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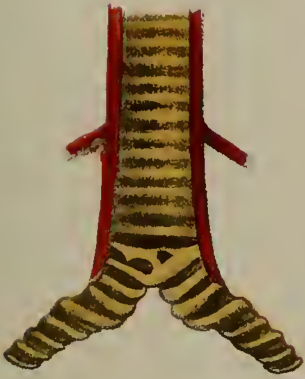
NATURAL HISTORY

Fig. 1.



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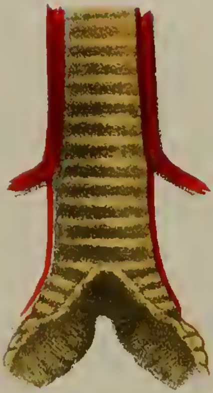

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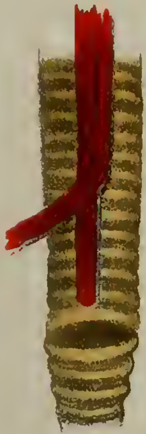

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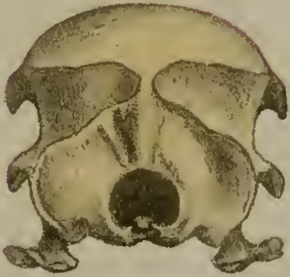

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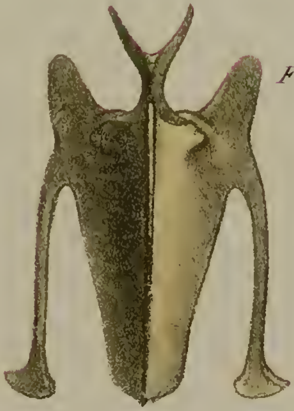

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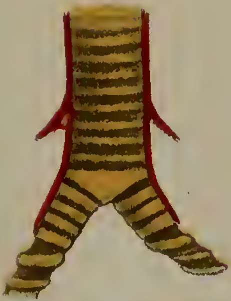

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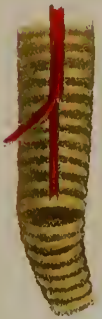

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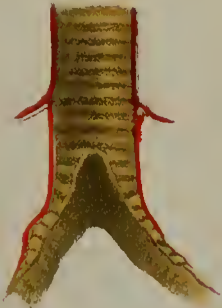

J. Smit lith.

Hanhart imp.

ANATOMY OF PASSERINE BIRDS.

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NATURAL HISTORY

C. J. Sundevall, in 1831, discovered that in the birds which he had the opportunity of examining that belonged to the order Passeres of Nitzsch, and only elsewhere in *Upupa,* the tendon of the *flexor longus hallucis* is quite independent of the *flexor perforans digitorum pedis,* a bond of union of one kind or other * joining them in other birds.

Keyserling and Blasius †, in 1839, established the law that (with the exception of the Alaudidæ) those Passerine birds in which the form of the lower larynx (named "syrinx" by Professor Huxley) is what is known as "oscine," possess a pair of long scutes as a covering to the back of the tarso-metatarse. They may therefore be called *bilaminate,* to facilitate description, the term referring to the tarsal scutellation only.

Johannes Müller ‡, from his elaborate investigations on the structure of the syrinx in the South-American Passeres, was led to divide the group into two major sections—those in which the intrinsic muscles of the voice-organ are inserted into the ends of the bronchial semi-rings, and those in which they are inserted into their middle parts. I would suggest the name *Acromyodi* for the former of these divisions, and *Mesomyodi* for the latter—an acromyodian bird being one in which the muscles of the syrinx are attached to the extremities of the bronchial semi-rings, a mesomyodian bird being one in which the muscles of the syrinx join the semi-rings in their middles. It seems to me advisable to restrict these terms to Passerine birds.

Müller found that among the mesomyodian Passeres there is a large collection of genera in which an easily recognized special type of syrinx exists. This group he separated off as "Tracheophonæ," so naming them on account of the large share taken by the peculiarly modified lower end of the trachea in the formation of the voice-organ. In one respect he made a retrograde step, because he did not lay sufficient stress upon the value of Nitzsch's work; and this was that he united the mesomyodian Passerine birds which are not tracheophone with those families which constituted the more expanded "Passeres" of Cuvier and with the Scansores, wavering between the two classifications, which may be expressed, with the employment of the term introduced above, as follows:—

1. Passeres Acromyodi (Oscines).
2. Passeres Mesomyodi Tracheophoni.
3. Picariæ.
    - *a.* Passeres Mesomyodi non-tracheophoni.
    - &c.

1. Passeres Acromyodi (Oscines).
2. Picariæ.
    - *a.* Passeres mesomyodi tracheophoni.
    - *b.* Passeres mesomyodi non-tracheophoni.
    - &c.

From the above remarks it is evident that Müller was led to lay too great stress upon the nature of the syrinx as a distinctive feature of the Passeres; and although Nitzsch was unacquainted with the existence of the mesomyodian voice-organ, there can be scarcely any doubt that had he lived subsequently to Müller he would never have separated its possessors off from their oscine allies, considering that he had fundamental palatal and pterylographic characters to fall back upon.

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* *Vide* Methodi naturalis Avium disponendarum Tentamen, 1872, p. xl.

† Wiegmann's 'Archiv,' 1839, i. p. 332.

‡ Abhand. d. Berl. Akad. 1846, p. 367.

The investigations of Macgillivray* and others have made it evident that colic cæca (of small size) are present in all true Passerine birds; and this fact, when correlated with the universal presence of a nude coccygeal oil-gland, has led me † to place them in near relationship with those other Cuvierian Passeres (the Cuculidæ excepted) in which the oil-gland is nude and cæca coli are always present—away from the remainder of his group, in which no cæca are developed and the oil-gland is tufted. The Passeriformes and Piciformes thus defined, all wanting the ambiens muscle across the knee, are included in my major division of the *Anomalogonatæ*.

Taking the summation of the characters above referred to, in association with others too well known to require special mention, the Passeres may be defined as those Anomalogonatous birds with the 2nd, 3rd, and 4th toes of the foot directed forwards, and the hallux backwards, in which the *flexor longus hallucis* muscle is independent of the *flexor perforans digitorum*, the colic cæca are short, the oil-gland nude, at the same time that it is of a characteristic shape, and the palate ægithognathous ‡.

Among the Anomalogonatæ there are three toes directed forwards in the Bucerotidæ, Alcedinidæ, Coliidæ, Upupidæ, Coraciinæ, Momotinæ, Caprimulgidæ, and Meropidæ; the *flexor longus hallucis* is free from the *flexor perforans digitorum* in the Upupidae; colic cæca are present in the Caprimulgidæ, Coraciinæ, Momotinæ, Galbulidae, Trogonidæ, Meropidæ, and almost certainly so in the Bucconidæ, in which families also the oil-gland is nude; the palate is ægithognathous in *Thinocorus*, *Turnix*, and the Cypselinæ, nearly so in the Caprimulgidæ and Trochilinæ.

My investigations into the myology of birds have supplied me with another character of great practical value, which, though in one or two cases slightly disguised, is never found in any but veritable Passeres. It is a peculiarity in the method of insertion of the tendon of the *tensor patagii brevis* of the wing.

In the triangular patagium of the wing of the bird the tendons of two muscles are to be found. One is that of the *tensor patagii longus*, which forms the supporting cord of the free margin of the membrane itself. The second is that of the *tensor patagii brevis*, which courses parallel with the humerus, not distant from that bone, to the muscles and fasciæ of the forearm. In the Ramphastinæ, Capitoninæ, and Picinæ, where this muscle is less complicated than in any other birds, it arises, as is generally the case, from the apex of the upper of the two processes at the scapular extremity of the furcula, as well as by a small special slip from the superficial fibres of the *pectoralis major* muscle, which differentiates itself off from the main muscle near the upper part of its inserted extremity. The comparatively insignificant triangular or compound fleshy belly thus formed, with its apex directed towards the elbow, terminates in a cylindrical tendon, which, included between the layers of the fibro-cutaneous patagium, takes a straight course to its insertion into the axially-running tendon of origin of the *extensor metacarpi radialis longus* of Schöpss, at a short distance from the tubercle on the humerus whence the muscle springs.

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* Audubon's Ornithological Biography, 1838.

† P. Z. S. 1874, p. 119.

‡ Prof. Huxley, "Classification of Birds," P. Z. S. 1867, p. 456.

As a result of this disposition, when the forearm is half-flexed, the tendon of the *tensor patagii brevis* is seen to enter the substance of the fibrous origin of the *extensor met. rad. longus*, and at right angles. This arrangement is indicated in Plate XLVIII. fig. 1, and is characteristic of the Picariæ, as defined by myself to include the three subfamilies above referred to and them only *.

Among the Passeres a slight, but easily recognizable, difference in the manner of insertion of the muscle maintains. The similarly single cylindroid tendon runs from the muscular belly, which has its origin at the shoulder, as above described, to the upper margin of the *extensor met. rad. longus* muscle, at an exactly similar spot: it does not, however, simply blend with the fibrous origin of that muscle; it becomes attached to it at the spot indicated, and then (again considering the forearm as half bent upon the humerus) runs back *independently* to be attached to the base of the tubercle of origin of the *extensor met. rad. longus*, slightly below that muscle's springing-point. As a consequence of this arrangement there are two tendons to be seen running to one spot (that on the upper margin of the *extensor met. rad. longus*, where the tendon of the *tensor* meets it) from two points, one the apex of the tubercle on the humerus above referred to, and the other, the depression at its base. These tendons therefore converge as they leave the elbow, having at first an appreciable interval between them, which is gradually diminished as they approach, although they remain quite free from one another, that of the *tensor* being superficial. A glance at Plate XLVIII. fig. 2, will serve to make this more clear.

I have had the opportunity of looking at this muscle in nearly 150 species of Passerine birds, belonging to nearly all the most important sections. I first observed it in *Pitangus sulphuratus*, and shortly afterwards recognized the same arrangement in *Hirundo urbica*. A Humming-bird (*Patagona gigas*) and a Swift (*Cypselus apus*) coming to hand at about the same time (the former through the kindness of Professor Newton) impressed me with the distinction between the Macrochires and the Swallows, as far as these elbow-muscles are concerned. Thus stimulated by the significance of the character, I have since taken every opportunity at my disposal to test its importance, the result being very favourable. Among the more aberrant genera I have examined are

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* P. Z. S. 1874, p. 123.

Struthidea,
Heteralocha,
Dicrurus,
Prosthemadera,
Melanocorypha,
Strepera,
Menura,
Atrichia,
Pitta,
Rupicola,
Lipaugus,
Tyrannus,
Chasmorhynchus,
Pipra,
Tityra,
Hadrostomus,
Cotinga,
Furnarius,
Picolaptes,
Thamnophilus,
Grallaria,
Pteroptochus,
Hylactes.

The only apparent exceptions I have found are the following. In *Pteroptochus albicollis* and in *Hylactes megapodius* the muscular fibres of the *extensor met. rad. longus* almost surround and enclose the tendons in question. Such being the case, the arrangement does not at first sight appear typically Passerine. Nevertheless, upon removing or pushing to one side these covering fibres, the two tendons are seen arranged exactly as in other members of the Order.

In *Menura superba* and in *Atrichia rufescens*, feeble-winged birds again, the arrangement is not typical, and the disposition of the parts is almost exactly as in the Pici, as above described. In other words there are not two tendons, one only being found, simple and broad, apparently produced by the blending of the two. Plate LI. fig. 2 represents the elbow-region of *Menura* as seen from its outer side.

All other Passerine birds which I have examined follow the single type, differing only in the angular divergence of the tendons, their humeral attachments being much separated in most Sturnidæ, Gymnorhinæ, and Tyrannidæ for example, but closely approximated in *Tropidorhynchus*, *Rupicola*, and others.

A short review of the peculiarities of the insertion of the *tensor patagii brevis* muscle in other birds will tend to render the importance of the character more clear, and may add some facts of interest in an ornithological point of view; for it is not in the least difficult for any one who has compared these structures in the various orders of the class to decide by an inspection of the outer surface of the elbow to which division any specimen belongs; and for the satisfaction of those naturalists who consider it essential that characters of importance should be verifiable on all occasions, it may be mentioned that from almost any skin, it is possible to decide the point by soaking it, or the wing alone, in cold water, and carefully removing the tegument thus relaxed. On the present occasion the arrangement in the Anomalogonatæ will also be almost solely discussed, although among the Homalogonatæ characters of nearly equal significance are attainable, somewhat diminished in clearness in some cases by the diffused state of the tendons.

In the Galbulidæ, as represented by *Galbula albirostris* and *Urogalba paradisea* (spirit-specimens of both of which genera have been kindly placed at my disposal by Mr. Salvin), the tendon of the short *tensor* is simple, or it splits slightly before it meets the metacarpal extensor (where the distal moiety there terminates). Its main continuation sends back to the outer side of the lower end of the humerus a free fasciculus exactly like that above described in the Passeres, except that from about the middle of its lower margin a thin slip runs downwards and wristwards to the fascia of the ulnar side of the outer surface of the forearm. This is represented in Plate L. fig. 1.

In the Meropidæ, as represented by *Merops apiaster* and *M. ornatus*, the only difference from the Galbulidæ is that the distal branch is more clearly differentiated, and the slip to the ulnar side of the forearm is nearer the angular bend. This arrangement is represented in Plate XLVIII. fig. 3. In *Todus viridis* the tendons are similarly disposed.

In the Coraciidæ, as represented by *Coracias garrula* and a species of *Eurystomus* which was not in sufficiently good cóndition to be more definitely determined, Plate XLIX. fig. 1 represents the distribution of the tendons, there being two parallel to one another, the anterior one of which runs to the superficial ulnar fascia before terminating, and sends wristwards a slip, like that in the Meropidæ, to the long *extensor*. There is a Passeriform free tendon running back to the lower end of the humerus from the outer tendon.

In the Momotidæ the condition is the same, except that the outer tendon does not split, and therefore sends forward no wristward slip. This condition I have found in *Momotus lessoni*, in *M. æquatorialis*, and in *Eumomota superciliaris*. The extension onto the ulnar superficial fascia springs from the portion of the horizontal tendon intermediate between the points of junction of the two parallel long tendons, and is not a direct continuation of either. It is frequently very thin.

In the Trogonidæ, as exemplified by *Trogon mexicana*, *T. puella*, and *Pharomacrus mocinno*, the condition is very complicated. It is seen in Plate LI. fig. 3. A superficial long muscular mass runs nearly to the long *extensor* of the forearm. It has a short broad tendinous insertion into the fascia of the outer surface of the forearm; and this is specially developed in a line running back to the humerus in a Passeriform manner. Deep of this are two parallel tendons: the one nearer the humerus terminates exactly like the single one of the Passeres; that further off ends as in the Pici above described.

In the Caprimulgidæ, as found in *Caprimulgus europæus* and *Chordeiles texensis* the arrangement is almost exactly the same as in the Meropidæ. The second outer tendon, however, is shorter.

In the Macrochires, including the Trochilidæ and the Cypselidæ, as found in many genera and species the arrangement is uniform. The fleshy belly runs on to a special tendon which springs from the lower end of the outer surface of the humerus (where the horizontal slip in the Passeres terminates), and is continued, parallel to the forearm, along the radial margin to the hand. Plate LI. fig. 1 exhibits this condition. It can be here seen that the tendon of the *tensor patagii brevis* is not developed, being replaced by the fleshy continuation of the muscle.

In *Upupa epops* the arrangement is fairly simple. The main tendon runs past the free lateral margin of the long *extensor* to the ulnar superficial fascia, where it becomes lost. It sends forwards a fasciculus from about its middle, to end like the similar band in the Meropidæ. It is figured in Plate L. fig. 2. Its difference from the Passerine arrangement is well-marked.

In the Bucerotidæ, as found in several species of *Buceros, Toccus,* and *Bucorvus,* the only difference from *Upupa* is that the extra outer fasciculus is very much shorter, as seen in Plate XLIX. fig. 2. The lengthy tendon from the major pectoral, which is particularly large, is represented.

In the Alcedinidæ the differences are so considerable in the several genera that I reserve the description of the muscle in this order for a future occasion.

As the Cuculidæ and Musophagidæ are frequently included together with the families above referred to, the arrangement of the short tensor in these birds is represented in Plate L. fig. 3 and in Plate XLIX. fig. 3. In all the Cuculidæ the undivided tendon runs on to the ulnar superficial fascia without any complication. In the Musophagidæ the whole tendon is comparatively feeble, and, if it were more definite at its margins, would be exactly like that in *Upupa.*

Next, with reference to the division of the order Passeres into minor sections.

Four or five pairs of muscles running to the ends of the topmost three bronchial semirings constitute the Oscine syrinx, the distinctive features of which are therefore its acromyodian and complex nature. MM. Keyserling and Blasius were the first to associate with this the bilaminate planta—an exception to which occurs in the case of the Alaudidæ, as we all know, these birds possessing a divided planta together with an Oscine syrinx. Mr. Sclater has kindly referred me to a paper by Mr. Strickland* on *Heterocnemis nævia* (there called *Holocnemis flammata*), in which it is shown that in that Formicarian bird the character of the planta is indistinguishable from that of the bilaminate Oscines. With reference to this and closely allied genera it must be noted that the scutellation of the front of the tarsus is also obliterated, so that the simplicity of the planta is only a participation of the condition which maintains in the tarsus generally. Therefore, with this exception (which from its associations can hardly be looked upon as such), it may be said as yet that *no bird which is not acromyodian has a bilaminate planta.*

Nevertheless the law enunciated by Cabanis, to the effect that when in a Passerine bird possessing ten primary remiges the first is very long, then that bird is not Oscine (or Acromyodian), but "Clamatorial" (or Mesomyodian), led that able ornithologist to place *Pitta* in the latter group, although it possesses a bilaminate planta; since which time Johannes Müller is not the only biologist who has wished to know the nature of the syrinx of that bird, of which Sundevall†, in 1872, remarks, "musculi laryngis inferioris ignoti."

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* Annals and Mag. Nat. Hist. 1844, vol. xiii. p. 415.

† Method. nat. Av. disp. Tentamen, 1872, p. 5.

Through the kind permission of Dr. Günther I have had the opportunity of dissecting two specimens of each of two species of the genus *Pitta*, namely *P. cyanura* and *P. angolensis*, from the National Collection; and Mr. Sharpe had previously very liberally given me a specimen of the Javan species, the dissection of which had led me in my paper "On the Carotid Arteries of Birds" to remove it from the Oscines *, as Cabanis had done from its wing-characters. Two specimens of *Pitta angolensis* from Fantee, and three of *P. cyanura* from Java, have therefore formed the material for the present description.

In *Pitta angolensis* the unmodified trachea terminates thoracically in a ring, split behind, and deep in front; which, from the fact that it presents irregularly placed fenestræ on its anterior surface, arranged in a somewhat transversely linear manner, appears to have been formed by the fusion of two rings. This terminal segment of the trachea does not, as in the Oscines and several other Passeres, form a three-way piece, because there is no antero-posterior bar traversing its inferior margin in the middle line. Of this, however, there is an indication in the form of a median backward-directed process, which advances a short distance into the inferior membraniform completion of the tube, from its anterior border. The tracheal ring last but one is complete, and has a slight median indentation in its inferior margin behind. These points are seen in Plate LIII. figs. 1, 2, & 3.

The first and second bronchial ring-segments are semirings—not modified into the somewhat separate, round-margined, slightly oblique semicircles of fibro-cartilage or bone which, as usual, are found nearer the lungs, but are like moieties of true tracheal rings, approximate, sharp-edged, and at right angles to the axis of the tube. They present no peculiar processes, and are slightly swollen at their anterior extremities.

There is only a single pair of bronchial muscles, continued down from the sides of the windpipe; insignificant in size; quite lateral, and terminating by being inserted into the middle of the outer surface of the second bronchial semiring.

Pitta cyanura differs from *P. angolensis* only in detail, not in plan of conformation. There are four instead of two syringeal bronchial semirings, to the middle of the last of which the single extremely feeble lateral muscle is attached on each side. In it also the last two tracheal rings, and not the last only, are incomplete behind, the last presenting a greater gap than the one above it. This syrinx is figured in Plate LIII. figs. 4, 5, & 6.

Pitta is therefore mesomyodian, in which respect it differs from all the known Old-World Passeres—although *Philepitta*, with its lengthy first primary, is most probably the same in this respect.

With reference to other points in the anatomy of the genus, it may be mentioned that in both *Pitta angolensis* and *P. cyanura* there is but one carotid artery, the left. The oil-gland is nude. The colic cæca are between one eighth and one tenth of an inch in length; and the muscles of the thigh are similarly arranged to those of most Passeres, the myological formula * being *A,XY*, the *ambiens* muscle being absent, at the same time that the *flexor longus hallucis* is quite independent of the *flexor digitorum perforans*. The palate is beautifully figured by Mr. Parker in his memoir on Ægithognathous birds †; and I take this opportunity of giving a view of the back of the skull and of the sternum, which present features of interest. It will be noticed that the temporal fossæ extend across the occipital region of the skull, and nearly meet in the middle line behind; this condition, though frequently found in other families, is not one possessed by any Passerine birds except *Pitta*, as far as I am aware. Plate LIII. fig. 8 shows the sternum of *P. cyanura*; in it the sternal notches are particularly deep.

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* P. Z. S. 1873, p. 463.

Menura superba is another bird in which our knowledge of the structure of the syrinx is very deficient. Mr. Eyton has described it ‡; but his account will bear supplementing. He tells us that "in addition to the usual sterno-tracheal muscles this curious bird has two other pair, both of which have their origin on the rings of the trachea on each side, at the point where it enters the cavity of the thorax. The anterior pair is inserted on the knobs at the extremities of the fourth bones of the bronchiæ; the posterior pair are also inserted on the bronchiæ, but on the three uppermost rings and on the posterior extremity of the fifth."

Several opportunities having occurred to me (partly through the kindness of Professor Flower in allowing me to dissect a specimen beautifully preserved in the Royal College of Surgeons, partly through the assistance of Mr. Edward Gerrard, and partly from my prosectorial advantages) of dissecting the syrinx of *Menura superba*, I take the present opportunity of describing it in detail and figuring it.

In *Menura superba* the last sixteen rings of the trachea are peculiarly narrow from above downwards. These are carinate in front; in other words, instead of being flattened from without inwards (as is usually the case, and is so in the rings above the sixteenth in this bird), they are compressed from above downwards, by which means a sharp-edged ridge is developed, which projects outwards a short way beyond the level of the interannular membrane. The lowest of these rings, the last tracheal, whilst participating in this peculiarity, is modified to form the three-way piece, whence start the bronchi, an antero-posterior bar joining the downward-directed angles which are developed on the middle of the front and back of the ring, and supporting the syringeal semilunar membrane.

As in the typical Oscines, the first three bronchial semirings participate in the formation of the syrinx, and are modified accordingly, being stronger, deeper, more flattened, and more approximate than those which follow. The first of these is simple; the second is peculiar in being hollow and thin-walled, broader in front than behind, and broadest a short distance (about equal to its depth at the spot) posterior to its anterior extremity; the third is narrower, and terminates behind by a short descending hook.

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* *Vide* P. Z. S. 1874, p. 111.

† Trans. Z. S. vol. ix. pl. lvi. fig. 6.

‡ Ann. & Mag. Nat. Hist. 1841, vol. vii. p. 49.

The syringal muscles are three in number on each side at their insertion, although at their origin only two can be distinguished. These are an anterior and posterior longitudinal, which, from a lateral point situated opposite the tracheal ring 19 above the last one, diverge forwards and backwards to the tips of the bronchial semirings. In Plate LII. figs. 1, 2, & 3 the front, back, and side views of the syrinx of *Menura* are figured.

The *anterior longitudinal* muscle, whose diameter is about four times that of the *depressor tracheæ*, is of uniform size throughout, being constituted of parallel fibres. It is inserted into the lower margin of the expansion at the anterior extremity of the second bronchial semiring, at a short distance behind its apex.

The *posterior longitudinal* muscle, from being single above, divides into two below.

Before proceeding further it will be necessary to explain the way in which these muscles arise. There is a large air-cell, the anterior thoracic *, in which the syrinx and base of the heart are situated. The visceral walls of this cell are so thin that the trachea may, to all intents and purposes, be said to perforate it. Where it does so, the membrane blends with its fascial sheath most intimately; and it is from the thus formed ring of junction that the long fibres of the syringal muscles spring. This ring is not a simple horizontal circle of fibrous tissue surrounding the trachea. In its anterior half it is so; but behind it descends for some distance on each side to a median spot situated below its general level, at a distance beneath it equal to the diameter of the tube itself, to blend at the angle thus formed with a strong fibro-cartilaginous ribbon, which expands below the level of the bronchial bifurcation, to terminate as a membranous covering to the front of the œsophagus.

From the postero-lateral portion of the horizontal moiety of the ring just described, and from its descending limb, the posterior longitudinal muscle of the syrinx arises, on each side, powerful, and in a single mass, of which the longer postero-external fibres, as it descends, differentiate themselves off to form an independent fasciculus, which is inserted into the posterior hooked extremity of the third bronchial semiring. The other much larger internal portion, composed mostly of much shorter and oblique fibres, is inserted into the posterior triangular surface of the tracheal three-way piece (last tracheal ring), and into the posterior extremity of the first bronchial semiring, a few of its tendinous fibres of termination apparently running on to the back of the membrane between the first and second semiring, and perhaps slightly to the back of the second semiring itself, although this last seems to be independent in this respect.

The comparatively slender *musculus sterno-trachealis* springs from the lateral surfaces of the four or five tracheal rings above the last two, emerging between the anterior and posterior intrinsic muscles.

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* *Vide* Owen's 'Anatomy of Vertebrates,' vol. ii. p. 211.

Menura superba, from the above description, is therefore acromyodian, although not typically Oscine.

Atrichia rufescens presents precisely the same arrangement as *Menura*. There are three modified bronchial semirings, the third descending posteriorly, and the second expanded a short distance before it reaches its anterior termination, the anterior longitudinal muscle being there inserted. The posterior muscle, however, does not clearly separate into two before it reaches its points of insertion, which are identical with those in *Menura*. The lower tracheal rings are different, in that they are not flattened from above downwards; they retain the characters of those above them to a great extent. The last forms the characteristic three-way piece. In Plate LII. figs. 4, 5, & 6 these points are clearly seen.

Atrichia is therefore also Acromyodian, although far from being normally Oscine. It would require but little modification in either it or *Menura* to convert their syringeal muscular masses into more numerous independent muscles. In the Crow, Starling, and most of the other Oscines I have examined, the third semiring is the one to which the long anterior muscle runs, the long posterior not going beyond the second. This condition is just reversed in the two birds under consideration. In the Finches the arrangement described by Cuvier maintains, both anterior and posterior long muscles running to the third bronchial semiring.

In Plate LII. fig. 7 the sternum of *Atrichia* is figured with the rudimentary clavicles (*f*), which are nothing more than granules of bone. No other Passerine bird wants the furcula, so far as is yet known. The manubrium sterni is not largely expanded.

There is another feature in Passerine anatomy which has interested me considerably during my investigations. It is the rule among birds, almost without exception, that the main artery of the leg is that which must be supposed to be represented in Man by the *comes nervi ischiatici*, it accompanying the sciatic nerve—the sciatic artery. The main nerve of the leg is the sciatic; the main vein the femoral. The only known exceptions to this rule are the cases of the genus *Dacelo* among the Alcedinidæ, and *Centropus* among the Cuculidæ. In the former the femoral vein is replaced by the one which is intermediate in situation between its usual course and the sciatic artery; in the latter the sciatic artery is absent, and is replaced by the femoral *.

In a certain few Passerine birds the main artery of the leg is the femoral, and not the sciatic. These genera are all members of the Oligomyodi of Müller; and the accompanying list contains the names of all the Oligomyodian species (taken from Messrs. Sclater and Salvin's 'Nomenclator Avium Neotropicalium' †) which I have had the opportunity of examining, with the results arrived at, as far as this peculiarity is concerned.

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* Proc. Zool. Soc. 1873, p. 629.

† London, 1873.

Passeres Oligomyodi.

With a femoral artery.	With a sciatic artery.
Chiroxiphia linearis,	*Mionectes oleagineus*,
Chiromachæris vitellina,	*Tyranniscus vilissimus*,
Heteropelma verœpacis,	*Pitangus sulphuratus*,
Tityra personata,	*Myiodynastes luteiventris*,
Hadrostomus aglaiæ,	*Empidonax minimus*,
Lipaugus sp.,	*Myiarchus crinitus*,
Cotinga cincta,	*Tyrannus melancholicus*,
Chasmorhynchus nudicollis.	*Rupicola crocea*,
	Pitta angolensis,
	Pitta cyanura.

I must mention also that in a specimen of the minute *Mitrephorus phæocercus*, it appeared to me that the artery of the leg was the femoral; but I should like to see more specimens before I can feel justified in disturbing any generalizations by using this single example.

All Acromyodian Passeres of species which I have examined, over one hundred in number, possess the sciatic artery, including *Menura* and *Atrichia*; and the Tracheophonæ quite agree with them in this respect. Such being the case, it seems to me that from among the Mesomyodian Passeres a small section may be divided off, including the families Pipridæ and Cotingidæ, in which a characterizing feature is the development of a femoral in place of a sciatic artery; and this being the case, *Rupicola* must be removed from the Cotingidæ.

Although, as yet, our knowledge of the anatomical characters which are the bases of the minor divisions of the Passerine group is still so little advanced, nevertheless a rough sketch of the classification of the order, in which no attempt to fill-in details can be made, is quite within our power.

To commence with Müller's character depending on the situation of the insertions of the syringeal muscles, Passerine birds fall primarily into two main sections, the ACROMYODI, in which the intrinsic muscles of the voice-organ are fixed to the end of the bronchial semirings, and the MESOMYODI, in which they join them at or near their middle. The former group includes all the true Oscines, together with *Menura* and *Atrichia*; the latter the Tracheophonæ, together with those Passeres included by Müller with the Picariæ, as well as Pitta.

The Mesomyodi fall into two groups, according to the situation of the main artery of the leg. Those in which the sciatic is the artery of the thigh may, because they therein agree with other birds, be termed *Homœomeri*; those in which the femoral artery is developed, from being in this respect abnormal, may be termed *Heteromeri*.

Of the Homœomeri the Tracheophonæ of Müller form a special well-marked section,—the rest, including the Tyrannidæ, *Rupicola*, *Pitta*, forming a division which may be termed Haploophonæ until there is reason for further splitting them up.

The following tabular arrangement expresses these views:—

- **PASSERES.**
  - ACROMYODI (Oscines).
    - NORMALES.
    - ABNORMALES.
      - Menurinæ.
        - *Menura.*
        - *Atrichia.*
  - MESOMYODI.
    - HETEROMERI.
      - Pipridæ.
      - Cotingidæ.
    - HOMŒOMERI.
      - Tracheophonæ.
      - Haploophonæ.
        - Tyrannidæ.
        - *Rupicola.*
        - *Pitta.*

In conclusion I have specially to thank Mr. O. Salvin for the extremely kind way in which he has placed at my disposal a large collection of Mesomyodian birds in spirit. From this I have been able to make out the peculiarity in the distribution of the vessels in the leg; and from it also I hope to obtain materials for another paper shortly, in which the syrinx of some of the yet little-known forms will be described.

EXPLANATION OF THE PLATES.

Plate XLVIII.

Fig. 1. View, from the outer side, of the muscles of the patagium of the left wing of *Ramphastos cuvieri*, the radius and ulna being bent at right angles to the humerus: *t.p.l*, tensor patagii longus; *t.p.b*, tensor patagii brevis; *e.m.r.l*, extensor metacarpi radialis longus; *d*, deltoid; *t*, triceps; *b*, biceps; *S.R*, secondary remiges.
2. Same of *Icterus vulgaris.*
3. Same of *Merops apiaster.*

Plate XLIX.

Fig. 1. Same of *Coracias garrula.*
2. Same of *Buceros rhinoceros.*
3. Same of *Musophaga violacea.*

Plate L.

Fig. 1. Same of *Urogalba paradisea.*
2. Same of *Upupa epops.*
3. Same of *Cuculus canorus.*

Plate LI.

Fig. 1. Same of *Patagona gigas.*
2. Same of *Menura superba.*
3. Same of *Trogon puella.*

Plate LII.

Fig. 1. Syrinx of *Menura superba*, front view.
2. Same, back view, with median fibrous attachment retained.
3. Same, view of right side.
4. Syrinx of *Atrichia rufescens*, front view.
5. Same, back view.

Fig. 6. Same, view of right side.
7. Sternum of *Atrichia rufescens*; *f*, rudiment of furcula.

PLATE LIII.

Fig. 1. Syrinx of *Pitta angolensis*.
2. Same, back view.
3. Same, side view (left).
4. Syrinx of *Pitta cyanura*.
5. Same, back view.
6. Same, side view (left).
7. Back view of skull of *Pitta cyanura*.
8. Sternum of same.

N.B. Although the artist has done all in his power to make clear the peculiarities of the insertion of the *tensor patagii brevis* in the families of birds here depicted, it is important to mention that in actual specimens the differences are much more easily recognizable than might be inferred from the figures.

June 20, 1876.

Professor Flower, F.R.S., V.P., in the Chair.

Mr. Sclater exhibited a drawing of a fine species of Fruit-pigeon of the genus *Carpophaga*, taken from two specimens living in the Society's Gardens, and pointed out that these birds, which had been received in exchange from the Zoological Society of Amsterdam, September 9th, 1874 *, had been incorrectly determined as *C. sylvatica*, and apparently belonged to *C. paulina*, Bp., of Celebes and the Sula Islands.

Extracts were read from letters received from Signor L. M. D'Albertis, C.M.Z.S., dated Sydney, March 27th, and from Dr. G. Bennett, dated April 15th, respecting Mr. D'Albertis's proposed new expedition up the Fly River, New Guinea.

Mr. Sclater also exhibited a small collection of bird-skins collected at Yule Island and on the adjoining coast of New Guinea, which Mr. D'Albertis had transmitted to him for examination.

Mr. Sclater stated that, the collection having been only just received, he had not had time to examine it carefully, but took the opportunity of pointing out the characters of two apparently new species of Parrots, of which it contained examples, as follows :—

1. TRICHOGLOSSUS SUBPLACENS, sp. nov.

Psittaceo-viridis, pileo summo flavicante; macula magna auriculari utrinque cærulea; subtus dilutior, lateribus et alarum tectricibus inferioribus coccineis; remigum pagina inferiore nigra fascia flava intersecta; rectricibus ad basin coccineis, inde nigris flavo terminatis, harum duabus mediis supra viridibus subtus nigris, linea media coccinea versus apicem occupatis; rostro rubro; pedibus rubro-flavidis: long. tota 6·5, *alæ* 3·5, *caudæ* 2·8.

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* See P. Z. S. 1874. p. 695.

Hab. Mountains of Naiabui, south of New Guinea (*D'Albertis* et *Tomasinelli*).

Obs. Similis *T. placenti*, sed uropygio dorso concolori nec cæruleo, pileo distinctius flavido et rectricibus magis rubris diversus.

2. CYCLOPSITTA SUAVISSIMA, sp. nov. (Plate LIV., ♂ et ♀.)

Supra psittaceo-viridis, remigibus nigricantibus, horum limbo exteriore cum fronte lata cæruleis; loris albis, genis nigris, gula media et fascia lata colli antica lactescenti-albis; pectore toto aurantiaco, ventre et tectricibus subalaribus pallide viridibus; rostro et pedibus nigris, iride nigra: long. tota 4·7, *alæ* 3 2, *caudæ* 1·3. Fem. *mari similis, sed genis cærulescentibus, colli lateribus aurantiacis et pectore flavicante diversa**.

Hab. Naiabui, New Guinea, September 1875 (*D'Albertis* et *Tomasinelli*).

Obs. Affinis *C. melanogeniæ* ex inss. Aroensibus, sed fronte cærulea distinguenda.

The following Letter, addressed by Commander W. E. Cookson, R.N., to Dr. Günther was read:—

"H.M.S. 'Peterel,' at sea,
"lat. 42° 40′ N., long. 28° 30′ W.
"May 29, 1876.

"In accordance with the wish of Rear-Admiral the Honourable A. A. Cochrane, I have much pleasure in forwarding to you two living tortoises, which I obtained from Albemarle Island when on a visit to the Galapagos group during June of last year.

"Before directing me to proceed to these islands, Admiral Cochrane sent me a copy of your letter to him, of May 18th, 1874, respecting their fauna, and desired me, if possible, to forward your wishes. This I have not succeeded in doing as thoroughly as I could wish; but I hope the specimens I have obtained may not be without value. The two living specimens are male and female, and undoubtedly adults; we found them about four miles inland, on a small elevated plain at the north-western extremity of the island. The plateau on which they were found was covered with stunted bush and high, very coarse, grass, through which their tracks were very numerous.

"Together with these live tortoises I send you the shells of five others, lettered A, B, C, D, and E. A, B, C are the shells of tortoises which we took from Abingdon Island; D, and E are from the same locality on Albemarle Island as the live ones come from.

"I greatly regret that the two Abingdon tortoises, which I hoped to have kept alive, died after being a few weeks on board, more especially as I believe a comparison between these and those from Albemarle Island will be a point of much interest; for the officers and myself were much struck with the difference in their general

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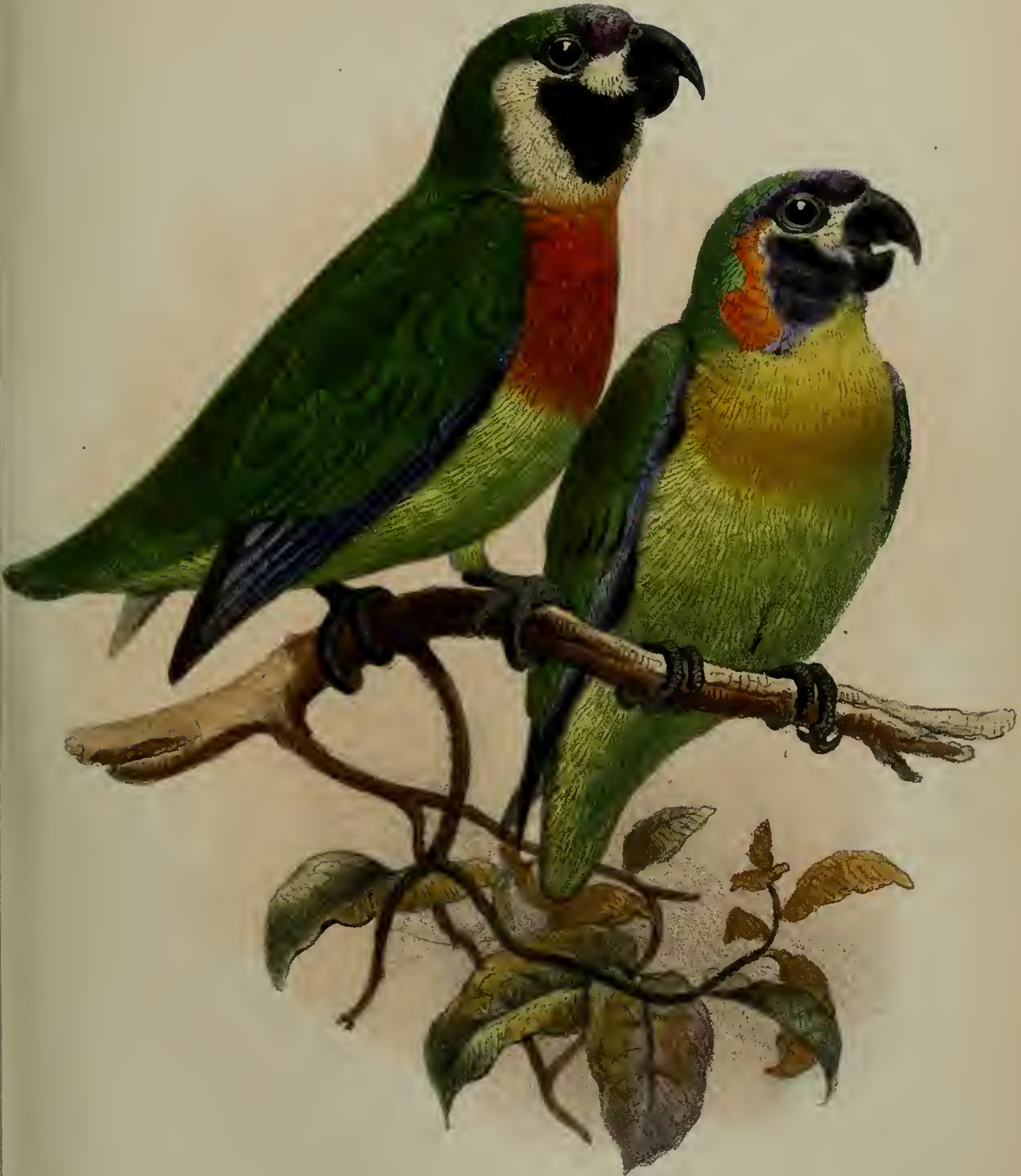
* I am indebted to the kindness of Count T. Salvadori for the loan of the skin of the female of this species, as likewise of skins of *C. melanogenia* for comparison.—P. L. S.



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CYCLOPSITTA SUAVISSIMA

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appearance. The most striking and what, I presume, would be the most *important* difference, is the *apparently* much greater length of the neck of the Abingdon tortoise. These creatures arch their neck considerably when stretching it out. All the four Abingdon tortoises we found had the jaws yellowish white, and nostrils pale pink; in the Albemarle tortoise these parts are nearly black. The carapace of the Abingdon tortoise is more compressed at the sides, slopes gradually up from the hind quarters to the shoulder, and has the back more arched than the Albemarle; but it is in the part protecting the head that the greatest difference lies, it being in the Abingdon tortoise contracted into a narrow highly arched hood-like form, which gives those animals a most singular appearance.

"As I have mentioned above, the two Abingdon tortoises died after being five or six weeks on board. The first (A) died at sea; and, owing to its size, I had no means of preserving it entire; but I have kept the vertebræ of the neck (bone diseased); and all the skin of the legs, neck, hind quarters, &c. is left attached to the carapace. The other Abingdon tortoise died after our arrival at Honolulu; there, fortunately, we met the 'Challenger'; and Professor Wyville Thomson most kindly preserved it for me in spirits. This tortoise, I presume, you have long since received, as Admiral Cochrane took it on board H.M.S. 'Repulse' in August last.

"Thinking that some of the information I gathered during my cruise amongst these islands may be of interest to you, I will give a few particulars about the tortoises, &c. &c.

"On our arrival at the settlement on Charles Island, we were entertained by the inhabitants with stories of tortoises of gigantic and marvellous size having been found on the islands twenty or thirty years ago, some being described as being so large as quite to rival the fossil tortoise of the Sewalik Hills; but none of these traditions were well authenticated. One in particular, which was conveyed to Peru in an English ship, was said to have weighed a ton. As I was informed that it came into the possession of Mr. Blacker, H.M. Consul at Payta, I wrote to that gentleman asking him if he could give me any information about it. In reply he says:—'I can only say that some fifteen or sixteen years ago an English captain did bring a very large tortoise, which was transmitted by him to Callao, and there exhibited on board, a charge being made for the privilege of seeing it, and finally shipped to England as a curiosity. The weight must have been considerable; but I cannot say it weighed a ton, which appears too much of a good thing; half that weight would have been about near the mark I should say.' Probably 6 or 7 cwt. would be nearer its actual weight; at any rate none of the present inhabitants, some of whom have been engaged in hunting tortoises for the last fifteen years, pretended themselves to have seen any weighing more than from 3 to 4 cwt.; and they considered the tortoise I send you (which weighed 240 lb. when taken) as large as any that are found now. I preserved a portion of the skull of what was said to be the largest tortoise seen for twelve or fifteen years; it was killed about six months before our arrival at the S.W. end of Albemarle Island. I landed at the spot in the hope of procuring the shell; but it was so decayed from exposure that I did not bring it away. The remaining portion of the skull could not be found.

"The settlers on Charles Island informed me that the tortoises are quite extinct on this island, and that only a very few are thought to remain on Chatham Island, these few (if any) being at the S.E. end of the island, which is the furthest point from the settlement, and a part which is covered with very dense bush. These two islands are the only ones of the group which are permanently inhabited. Hood, James, and Indefatigable Islands still contain a few tortoises in their most inaccessible parts; but they are so scarce that they are not now hunted on these islands: on parts of Albemarle Island it was said that they were still plentiful, especially at the S.E. end, where landing is generally impossible, and that some were to be found on the small island of Abingdon. To my inquiries as to whether the tortoises were different on the different islands, I received conflicting answers: some said they were all alike, others that there was a difference in shape, &c., &c.; and amongst other things I was told that the tortoises on Abingdon Island had white heads and feet, whereas those on the other islands had these parts black. They were said also to differ in shape from those of most of the other islands, but that the Hood-Island tortoise resembled the Abingdon, the same comparison to the Spanish saddle being used by them which Mr. Darwin quotes (Nat. Voy., new ed. p. 394). As Hood and Abingdon Islands are the most distant from one another of any in the group, it would have been very interesting to ascertain if their tortoises really resembled one another, whilst they differed from those of the other islands; but my whole stay in the archipelago was limited to a fortnight, and during that time I had to visit the settlements and collect information on various subjects for a general report on the islands; and as the inhabitants told me that my whole fortnight might be spent in a fruitless search in either Hood, James, or Indefatigable Islands, I was obliged to give up the idea of obtaining specimens from more than two islands, and decided upon obtaining some, if possible, from Albemarle and Abingdon Islands.

"At Charles Island I was fortunate enough to secure the services of an Englishman who has been engaged in making tortoise-oil for the last fifteen years; without his guidance we should, I think, have failed in our search on Abingdon Island.

"Our searching party on Abingdon Island consisted of 20 men, besides several of the officers. After some search we found four tortoises; one of these, owing to want of sufficient hands to carry them all, was killed on shore (shell "C"). The other three we brought on board the ship; it cost us, however, two days of very hard work: they had to be carried, slung from poles, a distance of six miles through a bush so thick that a trail had to be cut for the whole distance; besides which the whole surface of the island is covered with irregular blocks of lava, making the walking with a heavy load exceedingly tedious and laborious. To get the tortoises into the boats we had to lower them over the cliff, a height of about 200 feet. During this process, and more especially in the carrying-down, they received some rough treatment. There was no external injury; but whether caused by this or not, these tortoises never thrived like those we got from Albemarle Island; and, as I mentioned before, the two kept died after having been less than seven weeks on board, whereas all those from Albemarle Island remained in good health.

"Referring to the report that the Abingdon-Island tortoises had white heads and feet, I may here remark that of the four we found all had some of the nails of their toes yellowish white (a peculiarity which we did not observe in any of the Albemarle-Island tortoises); and their jaws were of the same colour, as I have before observed. Perhaps white colouring is only a mark of age.

"I will here describe the four Abingdon tortoises we obtained.

"'A' weighed 201 lb. when taken. This tortoise had every appearance of great age: its skin was very wrinkled and white, and the shell much battered and indented, with several patches of parasitic growth on it, which had the appearance of common bark-lichen. The vertebræ of the neck were diseased. This tortoise died at sea after being on board about six weeks.

"'B' weighed 131 lb. It was killed at sea, as I could not preserve all alive, and I hoped to keep the two larger ones. This tortoise was an adult male.

"'C' was killed on shore and not weighed.

"The fourth Abingdon tortoise is the one I have mentioned as having been kindly preserved in spirits for me by Professor Thomson, and which I hope has already reached you; it weighed 173 lb. when taken, and bore marks of age.

"From Abingdon Island I went to Tagus Cove, Albermarle Island; and here, on the small plain above mentioned, situated a few miles from the anchorage in the cove, we found altogether about 24 tortoises. Three were adult males, and weighed respectively 240 lb., 185 lb., and 173 lb.; three or four females also, averaging about 100 lb. in weight, were said by our guide to be full-grown; the remainder were in various stages of growth. The smallest found weighed 9 oz., and was pronounced to be about four years old. Of these, I have now on board the largest male and female; the pair next in size, together with two young ones in different stages of growth, Admiral Cochrane took on board the 'Repulse' in August last. Probably you have already received these tortoises, as the Admiral expressed his intention of forwarding them by the first opportunity.

"A tortoise which we found at the S.W. end of Albemarle Island, near to Iguana Cove, was also put on board the 'Repulse,' and, I hope, has safely reached you. This tortoise, a male, weighing 175 lb., was pronounced by our guide to be decidedly full-grown; but it differed considerably in shape and general appearance from all the full-grown tortoises we saw near Tagus Cove, being much more compact, and rounder in shape, and having the lines on the margin of the plates of the carapace quite sharply defined as in the young tortoises (which it resembled in shape), whereas in all the full-grown tortoises we had hitherto seen these lines were almost entirely gone. It was at this spot that our guide found, a few months before our visit, the largest tortoise that he had seen for the last fifteen years; he estimated its weight at about 400 lb.

"I have already mentioned that the shell of this large tortoise was so decayed that I did not take it on board; but I took some measurements of it, and am satisfied from these and its shape that the animal had the characteristics I have just described. The epidermoid layer of the shell had for the most part come away; but where fragments were left, the marginal lines of the plates showed quite distinctly. I suppose that abundance or variety of food would be sufficient to produce this difference of appearance in the tortoises from different localities in Albemarle Island, this part of the island, the S.W. end, having a comparatively luxuriant vegetation, whereas the neighbourhood of Tagus Cove is described by Mr. Darwin as being 'miserably sterile;' but it is a point not to be overlooked that these two localities are separated by a coast-line of 70 miles, and that between them lie three of the highest volcanic peaks of the whole group, one if not two of which have been active until quite recently; and from the flanks of all three streams of black lava descend, each several miles in width. Again, the most northern of these craters is situated almost in the centre of the narrowest part of the island, just a little to the north of Perry Isthmus, and sends down its black streams in all directions; so that this part of the island is exactly like Narborough Island opposite, which is described as 'a great volcano, whose base is surrounded by an extensive field of lava; it is utterly barren and desolate.' I think one may conclude that these lava streams are quite impassable to the tortoises, and that, as far as these creatures are concerned, the north and south ends of the island are as effectually separated as they would be by a channel of 40 or 50 miles of deep water.

"With regard to the greatly reduced numbers of these animals in most of the islands, and probable extinction in others, it is known that Charles and Chatham Islands have been inhabited for forty years, which fully accounts for the extinction of the tortoises in these islands, as they have always been eagerly sought for, the oil made from their fat being very valuable and their flesh much esteemed. Their habit of paying periodical visits to their watering-places, and the very plain tracks which they make through the bush or high grass, lead to their easy discovery. The track of a large tortoise is exactly that which a cart with very broad wheels and low body would make drawn over similar ground: the feet make a trail such as the wheels would leave; and between the 'ruts' the grass and low bushes are flattened down by the animal as they would be by the body of the cart. Hood Island never, I believe, had great numbers on it; but James and Indefatigable Islands, where they were at one time so numerous and are now so scarce, have long been resorted to by oil-makers. (Admiral Fitzroy found a party making oil on James Island in 1835.)

"To show the havoc made amongst the tortoises by oil-makers, I may mention that at the time of our visit a party of seven were making oil on Albemarle Island; during the last twelve months they had made 3000 gallons of oil, which quantity would represent the destruction of at least an equal number of tortoises; for although a large one will yield as much as six gallons of oil, the average yield would not be more than one.

"The whalers, who till within the last four or five years visited the islands to the number of 40 or 50 annually, committed great destruction amongst them; their crews living on them for several months, and when they left the ground taking large numbers to sea with them, some ships as many as a hundred.

"Of late years these defenceless creatures have had another very destructive enemy amongst them, viz. the wild dogs, descendants of dogs that have been turned adrift from ships or strayed away from time to time. Dogs are now roaming wild on all the larger islands. I was told that they keep in small packs of about eight or ten. We heard them on several occasions amongst the hills on Albemarle Island; and, judging from their cry, I should think there were about that number in the pack. They were described as large, gaunt, savage animals; but I could not get any accurate information as to their colour, and whether it was uniform or not. These animals must make great havoc amongst the tortoises. They are said to watch when the newly hatched young ones first begin to agitate the sand, then to scrape it away and devour the whole brood. They prey also upon the half-grown animals; two which we found, each about 60 lb. in weight, had the back part of the breast-plate gnawed by dogs; in one it was still bleeding; and I saw the shells of two others of about the same size, from which the animals had been eaten clean out.

"On account of the size of Albemarle Island, and the inaccessibility of many parts of it, I think tortoises are still very numerous on it and likely to be so for a long period in spite of their many enemies; but on the other islands, including the smaller ones, such as Abingdon and Hood Islands, where they have been hitherto comparatively unmolested, I think that they are now doomed to speedy extermination, for this reason, that within the last two years the Orchilla trade has passed into the hands of one individual, and the crop is now gathered by a gang of 60 or 80 men working together, instead of by a number of small parties scattered on the different islands. At the time of our visit the Orchilla crop had just been gathered from Hood Island, and the camp after a four months' residence on it had moved to Chatham Island. It was said that about 70 tortoises had been killed by these people on Hood Island; and our guide thought it most probable that none were left alive. As they pass on to Abingdon and the other smaller islands, the tortoises on them must share the same fate; for in three or four months a party of 60 men, but sparingly provisioned and hunting eagerly for them, would be almost sure to discover every individual."

Dr. Günther stated that not only the living tortoises, but also the shells of the specimens described in the foregoing letter, with a large and highly interesting collection of other zoological objects had arrived. There had not been sufficient time to examine the whole of the contents; so that a full report must be deferred to a future meeting of the Society. At present he exhibited the largest of several specimens of *Amblyrhynchus cristatus* ($4\frac{1}{2}$ feet long), and carapaces of the Abingdon and Albemarle Tortoises. The former was probably identical with *Testudo ephippium*; the latter came nearest to *Testudo elephantopus*. However, the skulls had not been extracted from the skins, and therefore could not yet be used in the determination of the species. Of the living examples collected by Commander Cookson at Tagus Cove, Albemarle Island, four had safely arrived in England, and were now living in the Gardens of the Society—two large ones, a pair, brought in H.M.S. 'Peterel,' and two smaller ones, probably both females, transferred by Commander Cookson to H.M.S. 'Challenger,' in which ship they arrived some weeks ago. None of the specimens put on board the 'Repulse' had arrived in England; and it was reported that all had been lost during a storm encountered by that ship on her voyage home.

Dr. Günther also mentioned on this occasion that he was now convinced that the two Aldabra Tortoises which were obtained last year, and which, owing to the excellent arrangements made at the Gardens, were doing very well, belonged to two distinct races (as pointed out in the forthcoming second part of his paper on these animals), viz. the male to *Testudo elephantina*, and the female to *T. hololissa*.

The following papers were read:—

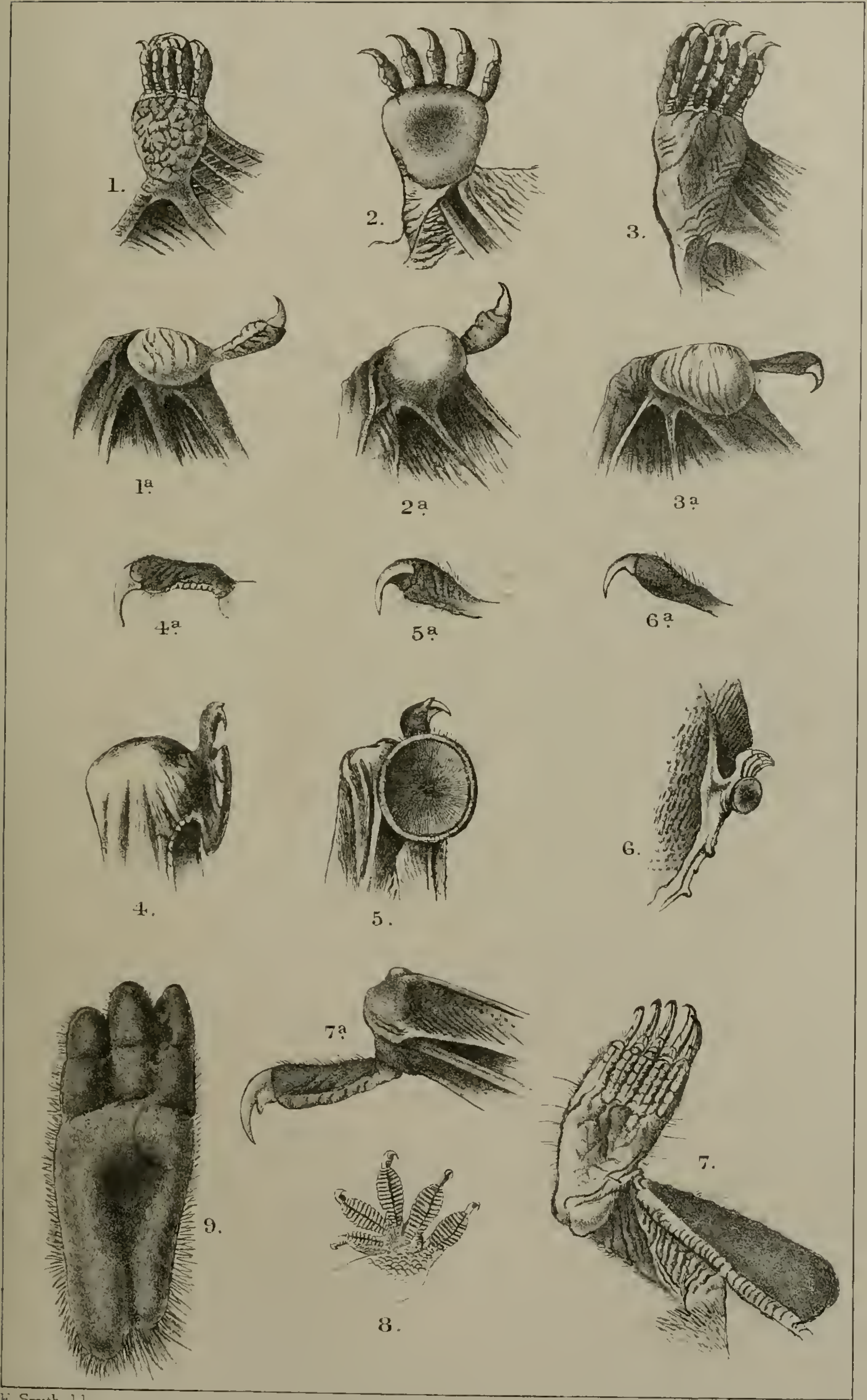
1. On peculiar Structures in the Feet of certain Species of Mammals which enable them to walk on smooth perpendicular surfaces. By G. E. Dobson, M.A., M.B., F.L.S., &c.

[Received May 26, 1876.]

(Plate LV.)

The peculiar apparatus in the feet of Geckoes, by means of which these animals are enabled to run about securely upon smooth perpendicular surfaces, has often been referred to; and every one has observed the facility with which the common house-fly and many other species of insects can walk upon the ceiling of a room; but the occurrence of analogous climbing-organs in some species of Mammals is not generally known, or, at least, has been but imperfectly described in two instances only—namely, in *Hyrax*, and in the very remarkable species of Bat, *Thyroptera tricolor*, from Tropical America.

Several travellers have described the remarkable climbing-powers of the species of *Hyrax*, some of which live in holes in trees, upon



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SUCTORIAL AND ADHESIVE FOOT-PADS OF MAMMALS.

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the smooth perpendicular trunks of which they run up and down with as much security as if their feet were provided with sharp claws. In 'The Heart of Africa'*, Dr. Schweinfurth has given a most interesting account of the habits of one of the species of this genus. He remarks:—"Abdoo, the controller of Mvolo, was half a naturalist; as a huntsman he had done service under many Europeans, and had acquired a reputation of being a skilful stuffer of birds. He drew my particular attention to the good sport afforded by the Rock-rabbits as they crept about in tempting proximity to the gate of the Seriba. At the same time he asked if I could account for the wonderful way in which the animals managed to clamber up and down smooth rocks that were almost perpendicular. 'I can't tell,' he said, 'how it is; but when you have shot one of the creatures, and catch hold of it, it sticks to the rock with its feet in its death-struggles, as though it had grown there.' The underpart of the foot is dark and elastic as india-rubber, and has several deeply indented cushions. This arrangement, which no other Mammalia or warm-blooded animals seem to possess, enables the creature, by opening and closing the centre cleft, to throw off part of its weight, and to gain a firm hold upon the smooth surface of the stone. The toes are nothing but pads of horny skin without regular nails, the hind foot being alone furnished on the inner toe with one claw, which is sharply compressed. For some time I could not at all comprehend how, with such a plump foot, the Rock-rabbit could climb so safely over precipitous walls of granite, or even along the polished branches of the little trees in the ravines; but the mystery was solved when I tried to pick up an animal which I myself had wounded. The granite was smooth as pavement; and yet, when I seized the creature by the neck, it clung like birdlime to the ground, and required some force before it could be removed."

The very peculiar feet of *Hyrax* were first described by Bruce †; and as his description is the most complete that has been taken from the animal in its native country, I think it necessary to quote it here in full. Of the Askoko of Abyssinia (probably *H. abyssinicus*) he writes as follows:—"This curious animal is found in Ethiopia, in the caverns of the rocks, or under the great stones in the Mountain of the Sun behind the queen's palace at Koscam. It is also frequent in the deep caverns in the rocks in many other places in Abyssinia. It does not burrow or make holes as the rat and rabbit; nature having interdicted him this practice by furnishing him with feet the toes of which are perfectly round and of a soft pulpy tender substance; the fleshy parts of the toes project beyond the nails, which are rather broader than sharp, much similar to a man's nails ill grown. His hind foot is long and narrow, divided with two deep wrinkles or clefts in the middle, drawn across the centre, on each side of which the flesh rises with considerable protuberancy; and it is terminated by three claws (? toes): the middle one is the longest.

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* Vol. i. p. 385.

† 'Travels to discover the Source of the Nile in the years 1768–73,' vol. v. description of pl. 24.

The fore foot has four toes, three disposed in the same proportion as on the hind foot; the fourth, the largest of the whole, is placed lower down on the side of the foot, so that the top of it arrives no further than the bottom of the toe next to it. The sole of the foot is divided in the centre by a deep cleft like the other; and this cleft reaches down to the heel, which it nearly divides. The whole of the fore foot is very thick, fleshy and soft, and of a deep black colour, altogether void of hair, though the back or upper part of it is thickly covered, like the rest of its body, down to where the toes divide."

"The centre cleft" of Dr. Schweinfurth appears to be the groove represented in Plate LV. fig. 9, and Fig. A, which passes backwards from a slight concavity in the centre of the sole of the foot and divides the heel. I am unable to feel equally satisfied with that distinguished traveller that the simple acts of opening and closing that cleft or any cleft in the foot are sufficient to enable the animal "to throw off part of its weight and to gain a firm hold upon the smooth surface of the stone." In the ordinary condition of the foot, the central concavity is evidently not of sufficient depth or extent to cause the strong adhesion of the sole to the rock as described. I believe that the source of this remarkable adhesive power may be traced in the general structure of the extremities.

Through the kindness of Prof. W. H. Flower, I have been enabled to examine the structure of the extremities in a specimen of *Hyrax dorsalis* preserved in alcohol in the Museum of the Royal College of Surgeons; and the valuable treatises on the myology of *Hyrax capensis* by Messrs. Murie and Mivart and by Prof. J. F. Brandt have afforded me great assistance in my examination.

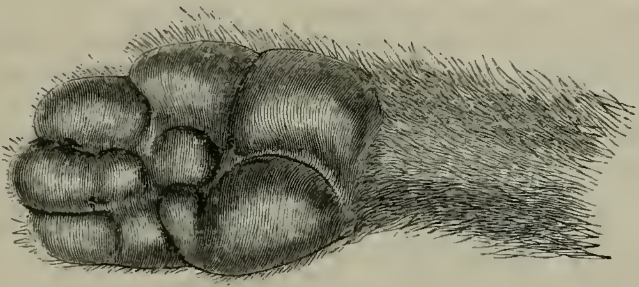
Hyrax dorsalis may be taken as a representative of that section of the genus in which the climbing-powers are, apparently, most developed, the animals of this species inhabiting holes in trees, on the vertical stems of which they run up and down with the greatest facility. The habits of the species of this section suggested the subgeneric name *Dendrohyrax*.

In the specimen of *Hyrax dorsalis* examined by me the soles of the feet had become quite hard and rigid from the action of the alcohol in which it was preserved; but prolonged immersion in solution of cyanide of potassium almost restored them to the original soft condition, which we know (from Bruce and Schweinfurth's descriptions made from examination of the living animal in its native country) is the normal state of the sole of the foot during life.

In all climbing four-footed animals the anterior extremities perform by far the most important part in maintaining their hold; and the species of *Hyrax* form no exception to this rule.

The fore foot has five toes (one, the pollex, being rudimentary and concealed beneath the skin); the hind foot three only (Plate LV. fig. 9). The toes are united as far as the bases of the terminal phalanges; the outer toe of the fore foot is united along its whole length. The nails are flat and short; and beyond them the soft extremities of the toes project, except in the case of the inner toe of the hind foot, which is armed with a small blunt hoof-like claw placed on the upper and outer side of the toe, next the middle toe, its projecting outer margin being received into a deep groove in the side of the middle toe when the toes are approximated (Plate LV. fig. 9, and Fig. A).

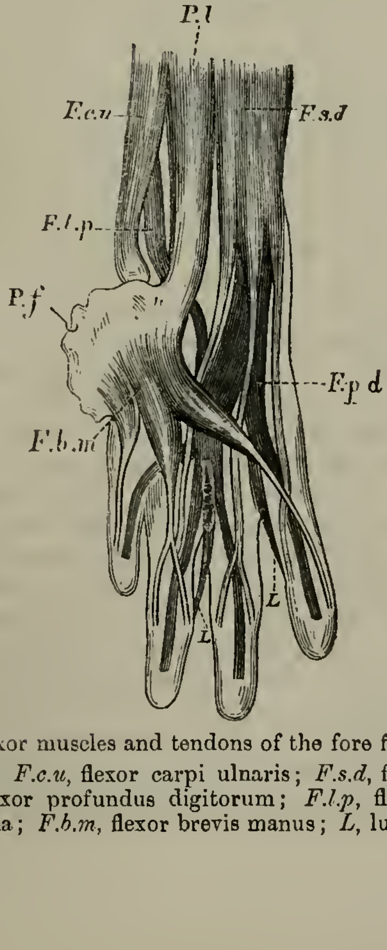
Fig. A.



Sole of foot of *Hyrax dorsalis.*

The transverse clefts in the sole of the foot, described by Bruce and Schweinfurth (and shown in fig. A), correspond simply to

Fig. B.



Flexor muscles and tendons of the fore foot.

P.l, palmaris longus; *F.c.u*, flexor carpi ulnaris; *F.s.d*, flexor sublimis digitorum; *F.p.d*, flexor profundus digitorum; *F.l.p*, flexor longus pollicis; *P.f*, palmar fascia; *F.b.m*, flexor brevis manus; *L*, lumbricales.

the lines of flexion indicating the position of the joints of the toes, and the longitudinal cleft dividing the heel to the groove along which the tendons of the flexor muscles enter the sole of the foot; but the great depth and extent of these grooves evidently allow of very free motion in the sole during flexion and adduction, the importance of which will be seen when we investigate the mechanism on which the adhesive power of the foot depends.

There is nothing therefore in the structure of the sole of the foot alone which can explain the extraordinary power of clinging to smooth surfaces which we know the species of *Hyrax* possess.

In dissecting the flexor muscles of the forearm the comparatively very large size of the *palmaris longus* is particularly noticeable (Fig. B, *P.l*). This muscle, arising from the internal condyle of the humerus and from the intermuscular fascia, forms a broad and strong tendon which, passing into the sole of the foot, spreads out into the palmar fascia, which contains a fibro-cartilaginous disk. From the superficial and deep palmar fascia, and from this fibro-cartilaginous disk, arises a very peculiar muscle (first described by Messrs. Murie and Mivart*), the *flexor brevis manus* (Fig. B, *F.b.m*), which is inserted by three tendons into the second, fourth, and fifth toes. The tendon going to the second, or inner toe, is inserted on the inner side of the tendon of the *flexor profundus,* while that going to the fifth or outer toe is inserted on the outer side of the tendon of the same muscle; the middle tendon forms, with the corresponding tendon of the *flexor sublimis,* the perforated tendon of the fourth toe; and as this toe is so much longer than the second and fifth toes, the positions of the insertions of the three tendons of the *flexor brevis manus* occupy nearly the same line across the foot.

If we take a line drawn along the middle of the fore foot from the centre of the carpus to the extremity of the third toe as the centre line of the foot, we find the insertions of the *flexor brevis manus* on either side of this line, two of the three tendons being inserted at points on opposite sides of the foot furthest from the centre. The action of this muscle must therefore be, not only to flex the outer and inner toes, but also to rotate them slightly and draw inwards both sides of the foot towards the centre line. In this action the tendency to cup the sole of the foot is evident. Further, as the *flexor brevis manus* arises from the palmar fascia, it follows that this muscle can only act effectively when its point of origin is fixed; and this is accomplished by the action of the strong *palmaris longus,* which, as we have seen, terminates in the palmar fascia. In the co-ordinate action of these two muscles on such a foot provided with a soft elastic sole and united toes we have, I believe, all that is necessary to produce the remarkable power of adhesion of the foot to any smooth surface on which it may be placed, which has been observed in most species of *Hyrax.*

The *palmaris longus,* in fixing the palmar fascia, removes the pressure of the centre of the sole of the fore foot, while the soft elastic sides and heel are in close contact with the surface on which the animal is walking; at the same time the *flexor brevis manus* elevates the greater part of the anterior half of the sole by pressing the extremities and sides of the outer and inner toes downwards and also drawing them towards the centre line of the foot, thus producing a condition of the sole of the foot analogous to the sucking-cup of a cephalopod.

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* *L. c.* p. 341. Messrs. Murie and Mivart (with the sanction of the Council of the Society) have kindly permitted me to make use of one of the wood blocks (Fig. B) from which the illustrations accompanying their paper were printed.

In the hinder extremities the same conditions are fulfilled, though evidently much less effectively. The homologue of the *palmaris*, the *plantaris*, is also very large, and arises from the external condyle of the femur; and its tendon similarly passes into the sole of the foot to form the plantar fascia from which the *flexor brevis digitorum* arises as the *flexor brevis manus* in the fore foot.

The softness and elasticity of the sole of the foot (described by Bruce and Schweinfurth) permit of nice adaptation to slightly uneven surfaces, and render the suctorial action, by which cohesion is maintained, possible. As it appeared evident to me that this soft condition of the sole must depend not only on large development of the subcutaneous areolar tissue, but also on a permanently moist state maintained by the secretions of numerous sudorific glands, I was not surprised to find, on examining several horizontal and vertical sections of the integument of the sole of the foot, that the sudorific glands were exceedingly numerous, at least fifteen times as numerous in a given space as in the sole of the human foot, amounting to 40,000 in the square inch*.

With such an enormous number of sudorific glands the sole of the foot is doubtless kept constantly moist, and in the most favourable condition for adhering to smooth or slightly uneven surfaces, when it is converted into a kind of suctorial disk by the action of the muscles as described above.

It might appear strange that, with such a soft sole to the foot, the animal could run with impunity over hard and occasionally angular surfaces; but I find that the sole is everywhere protected by a deep layer of epithelium, in no place less than $\frac{1}{25}$ of an inch in thickness. The importance of the great number of sudorific glands is here again apparent; for, with such a deep layer of epithelium, the sole of the foot would soon become quite horny from the effects of constant pressure, were it not not kept constantly moist by an abundant glandular secretion†.

In the very remarkable species of Bat, *Thyroptera tricolor*, first described by Spix‡, we find the only known instance (in Mammalia) of the presence of prehensile organs resembling the sucking-disks of Cephalopoda. On the inferior surface of the thumb, from the base of the first phalanx, and from the sides of the metacarpo-phalangeal joint, corresponding to the position of the ball of the thumb in other Bats, arises by a short peduncle a circular hollow suctorial disk about one tenth of an inch in diameter (Plate LV. fig. 5, enlarged). On the sole of the foot a similar but considerably smaller disk (fig. 6) is placed, not in the same relative position, however, as on the thumb; for it covers the metatarsal bones, not the bases of the first phalanges of the toes.

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* I have arrived at this calculation from observing that sometimes five, but more frequently four of the openings of the sudorific ducts were contained within a measured space equal to the square of $\frac{1}{100}$ of an inch. If, therefore, we assume four as the average number in this space, it follows that exactly 40,000 are contained within a square inch.

† The significance of the *retia mirabilia* in the extremities of *Hyrax*, first described by Hyrtl, will be at once understood when we consider how necessary it is to maintain a constant vascular condition of the foot in order to keep up the abundant secretion poured forth by the numerous sudorific glands.

‡ Simiar. et Vespert. Brasil. 1823, p. 61, pl. xxxvi. fig. ix.

In a paper published in the 'Boletin revista de la Universidad de Madrid,' by Señor Jimenez de la Espada, a member of the Spanish Expedition to explore the natural productions and physical conditions of South America, the author relates his observations on the habits of this species, and describes the sucking-cups. I have not been able to procure a copy of this paper; but fortunately a full abstract of the part relating to *Thyroptera tricolor* is given in the 'Zoological Record' for 1870, as follows:—

"The sucking-cups consist of a coriaceous disk; they are little hemispheres, hollow, flexible, and extremely movable, on the first phalanges of the thumbs of the wings and near the heels on the soles of the feet. They were used by the animal to fasten itself to the fingers as it tried to bite, producing the same feeling as a key or thimble when applied to the tongue after sucking out the air. These cups are deep, membranaceous on the edge, fleshy in the centre, those on the wings larger than those on the feet. The muscular arrangement is such as to allow the animal to vary the diameter of the organ; and by their means the animals attached themselves to the sides of the box in which they were kept, although, when sleeping, they suspended themselves by the claws like other Bats."

With the latter part of the above statement, referring to a muscular arrangement in a sucking-disk, I am quite unable to agree. Microscopical sections of the disk made in every direction failed to exhibit the slightest trace of muscular fibre; and I believe that the animal does not possess the power of varying the diameter of the organ by direct muscular agency. Indeed the presence of a muscular arrangement in the sucking-disk of *Thyroptera tricolor*, such as Señor Jimenez de la Espada refers to, would be a most remarkable anomaly; for this species would possess special muscles of which not the slightest homologue could be found in any other vertebrate animal. But nature does not form complicated organs where simple ones are equally or sufficiently effective. The remarkable sucking-cups of *Thyroptera* are evidently but highly differentiated conditions of the integuments and superficial fascia of the balls of the thumbs and soles of the feet. This is shown by their position, by their structure, and by the presence in other Bats of analogous conditions of the same parts, which must be also considered homologous.

In *Vespervgo nanus*, Ptrs., *V. tylopus*, Dobson (Plate LV. figs. 1 & 3), and especially in *V. pachypus*, Temm. (fig. 2), the sole of the foot is very broad, slightly concave, and almost circular in outline, so much expanded as to project considerably beneath the toes. The toes are very short and have feeble claws. The ball of the thumb covering the metacarpo-phalangeal joint is also much expanded and flattened. This remarkable condition of the sole of the foot and of the thumb is seen, on examination by the microscope, to be due to the great development of the integument and areolar tissue. In these Bats the feet are undoubtedly adhesive, enabling them to walk on smooth hard surfaces, where the claws could afford but slight aid in progression; but the adhesive power is evidently much inferior to that possessed by *Thyroptera*; nevertheless the difference in structure between the comparatively simple adhesive sole of the foot and thumb of *V. pachypus*, and the highly differentiated sucking-cups of *T. tricolor* is one of degree only.

The walls of each cup are composed, from without inwards, 1, of skin (continuous with the integument of the thumb); 2, of a middle layer of connective tissue with cartilage cells and glandular tissue; and, 3, of a thin epithelial layer lining the concavity of the cup, having on its surface the openings of glands, which are most abundant near the margin of the disk. The middle layer at the base of the cup, for a short distance around the point of its connexion with the short pedicle which attaches it to the thumb, consists almost entirely of cartilage cells, which soon become considerably thinned out and replaced by another form of connective tissue. This connective tissue, which forms the greater part of the walls of the suctorial disk, lying (as already described) between an outer and inner* layer of integument, appears to consist of two layers, that lying next the external integument being very dense and having a few cartilage cells, while the inner layer lying next the thin epidermis lining the cup consists of rather broad fibres radiating from the cartilaginous base of the cup towards its circumference, and which cause a corresponding radiating appearance in the cuticle lining the concavity of the cup (see Plate LV. fig. 5).

These radiating fibres no doubt suggested to Señor Jimenez de la Espada the idea of a muscular apparatus; but, as I have already remarked, no trace of muscular tissue can be detected in them or in any other part of the disk. They are about $\frac{1}{100}$ of an inch in diameter and extend from the cartilaginous base of the disk outwards to within a short distance from its free margin, being separated from each other by a thin layer of connective tissue derived from the outer part of the middle layer. Examined under high powers and with an immersion-lens, they appear solid and almost structureless †. Although they do not present the characters of ordinary elastic tissue, they are, I believe, elastic, and must be considered a modified condition of the *corium* of the sole of the foot, their form being dependent on the direction in which the stretching force acts when the edge of the disk is fixed.

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* The terms "outer" and "inner," used with reference to the suctorial disk, refer to its convex and concave surfaces, which I here, for convenience, consider its outer and inner sides respectively.

† Prof. Turner has kindly examined these radiating fibres for me; he says:—"With careful focusing I think that I can recognize traces of structure in each fibre; there are appearances of very minute elongated nuclei, such as one sees in tendon. . . . . . I am disposed, on the whole, to regard them as a modification of connective tissue, though not elastic." Prof. Turner means by this that they do not present the characters of what is commonly known as elastic tissue.

The circular rim of the suctorial disk is composed of the free margins of the outer and inner layers of integument (homologous respectively with the integument covering the sides and soles of the foot in other Bats) which together form a flattened elastic ring (as shown in Plate LV. fig. 5), which, moistened by the secretions of the sudorific glands opening on the concave surface of the disk, fits accurately to any smooth surface on which it may be placed. The simple action of throwing the weight of the body on the base of the cup while its circular rim is applied to any smooth surface, is sufficient to fix it there; for the integumentary layers and connective tissues of which it is composed are thereby stretched, and its concavity increased in depth, thus causing a partial vacuum.

That these suctorial disks are not always sufficient alone to enable the animal to climb is shown by the presence of small projections from the posterior margin of the calcaneum (Plate LV. fig. 6), which evidently are used to assist the foothold when climbing. In no other species have I observed similar projections; and this is another peculiarity in which this remarkable species differs from all other Bats.

In *Mystacina tuberculuta* (of which several peculiarities have been described by me in a preceding paper, see above, p. 486) the sole of the foot is formed of deeply wrinkled very lax skin, which also extends along the inferior surface of the flattened and short legs (Plate LV. fig. 7). The toes, in the arrangement of the integument, present a remarkable resemblance to those of *Hemidactylus* (comp. fig. 8). Each toe is divided by a central groove, from which smaller transverse grooves proceed outwards to the margins. As I have shown (in the paper referred to), the whole external structure of this species is peculiar: the wings and interfemoral membrane are folded away beneath a portion of the membrane along the sides of the body, which is specially thickened, and forms a protective case as perfect as the elytra of a coleopterous insect, with which it is, indeed, strictly analogous; the extremities are very strong, and the claws armed with basal denticles (Plate LV. fig. 7 *a*), so that this species is the most quadrupedal of Bats, and also the most fitted for climbing among all the known species of Chiroptera (except perhaps *Thyroptera tricolor*). Undoubtedly the sole of the foot and under surface of the leg are specially modified in relation to the habits of the animal, assisting it most materially in clinging to smooth surfaces where the claws are unable to penetrate sufficiently deep.

EXPLANATION OF PLATE LV.

Fig. 1. Foot of *Vesperugo nanus*, Ptrs.
  1 *a*, 4 *a*. Thumb of ditto.
  2. Foot of *V. pachypus*, Temm.
  2 *a*, 5 *a*. Thumb of ditto.
  3. Foot of *V. tylopus*, Dobson.

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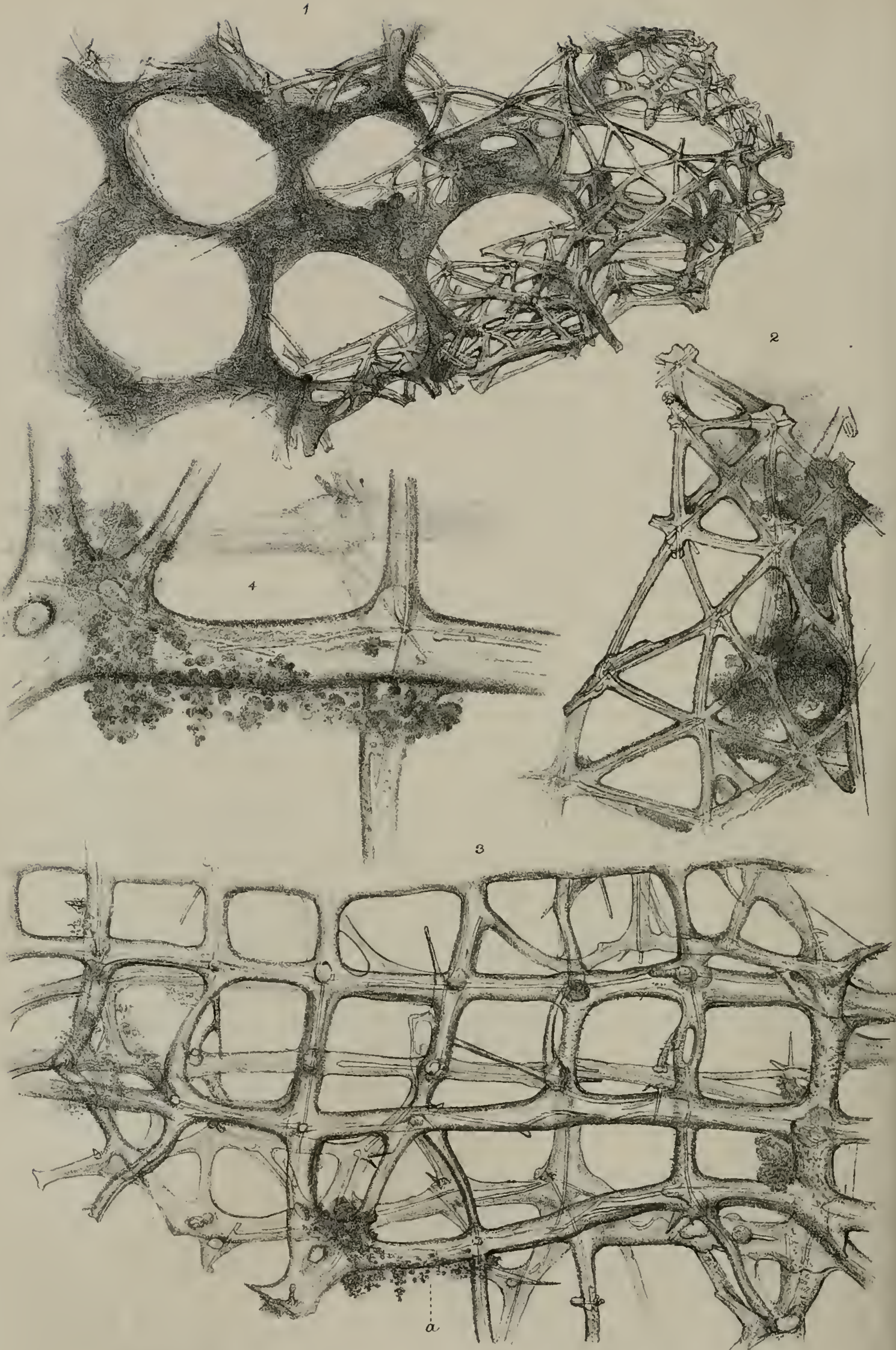

Deanea favoides 1-2. Farrea inermis 3-4

J. Dinkel del. et lith.
W West & Co. imp.

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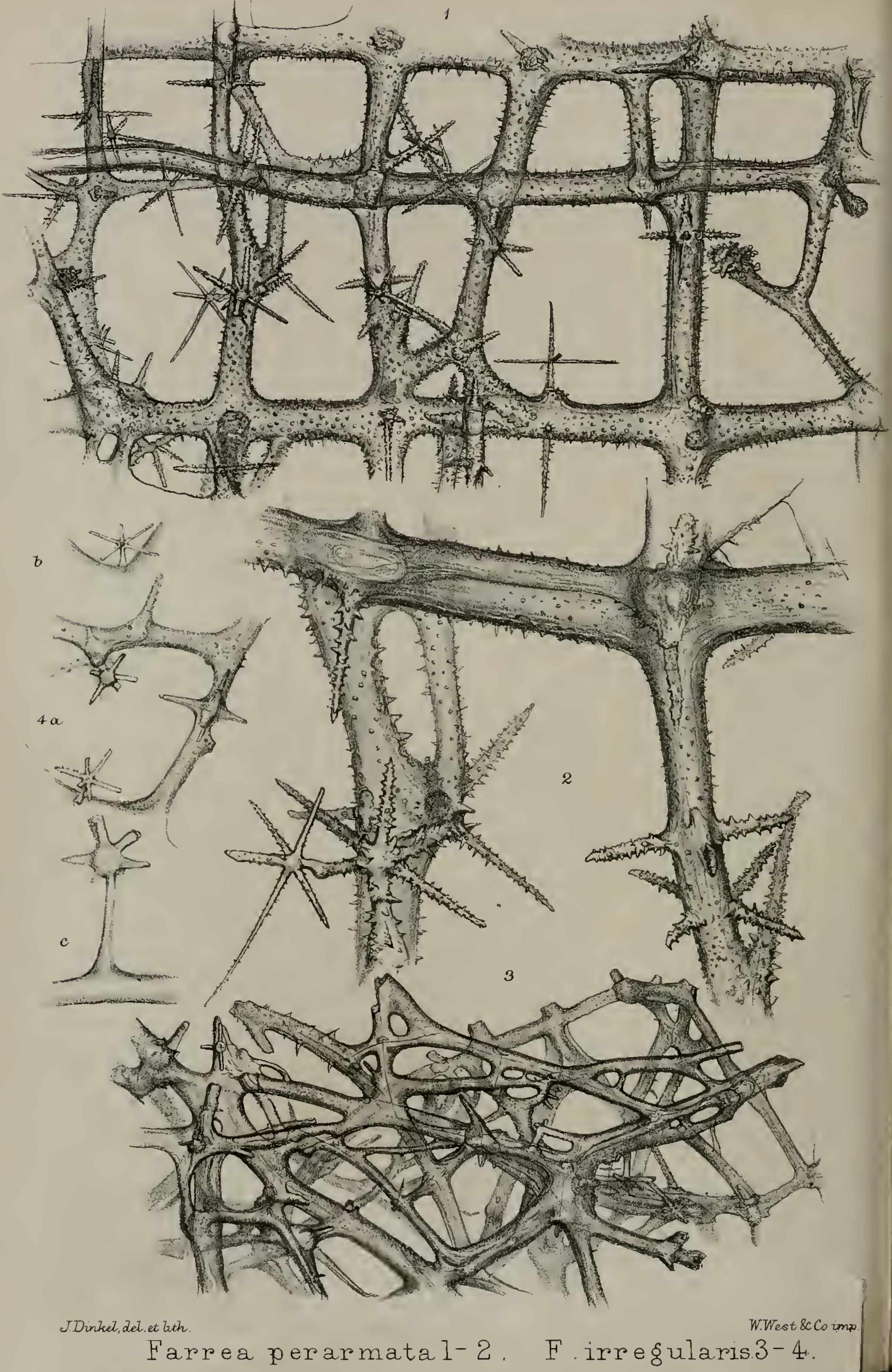

J.Dinkel, del. et lith.

W.West & Co imp.

Farrea perarmata 1-2. F. irregularis 3-4.

Fig. 3 *a*, 6 *a*. Thumb of ditto.
4, 5. View of side and concave surface of suctorial disk of *Thyroptera tricolor*, Spix.
6. Foot of *T. tricolor*, with suctorial disk, also calcaneum with projections from its posterior margin.
7. Foot and part of the inferior surface of the leg of *Mystacina tuberculata*, Forst.
7 *a*. Thumb of *M. tuberculata*, showing denticle at base of claw.
8. Foot of *Hemidactylus coctæi* (Geckotidæ).
9. Hind foot of *Hyrax dorsalis*.

2. A Monograph of the Siliceo-fibrous Sponges. By J. S. Bowerbank, LL.D., F.R.S., F.Z.S., &c.—Part VI.

[Received May 31, 1876.]

(Plates LVI. & LVII.)

Deanea favoides, Bowerbank. (Plate LVI. figs. 1, 2.)

Sponge laminar or cup-shaped, thin, resembling a thin section of a honeycomb. Surface even. Dermis thin, translucent, aspiculous. Oscula and pores unknown. Skeleton symmetrical, rotulate; rotulæ confluent; fibres cylindrical; central canals large and very distinct. Sarcode dense, opaque, amber-coloured.

Colour, in the dried state, dark amber.

Hab. West Indies? (*Captain Hunter?*).

Examined in the dried state.

This is a remarkably constructed sponge. It consists of a very open reticulate structure, closely resembling a thin slice of the cells of the comb of the honey-bee taken at right angles to the long axis of the cells. The parietes of these large open areas are constructed of a confluent rotulate rete of the same form as that of the skeleton-structure of *Deanea virgultosa*, described in the Society's 'Proceedings,' 1875, p. 275; and, as in that species, the fibres are all canaliculated and confluent, but the canals are not quite so strongly produced. The external surface and open spaces of the sponge do not appear to be covered with a continuous dermal membrane; but it covers the interstices of the rotular areas of the skeleton rete, and is in those parts thickly coated with a dense and nearly opaque layer of sarcode.

The dermal membrane appears to pass inward and to line the interior of the large open spaces of the skeleton-structure; and in no instance could I find even a fragment of the membranous and sarcodous structures projected into the large open areas of the sponge, although upon their parietes it is in a perfect state of preservation. We may therefore reasonably infer that in a living state these great orifices are in an open condition.

The dermal surface is quite smooth; and a comparatively thick dense stratum of dark sarcode intervenes between the dermal membrane and the siliceous skeleton.

I have no certain record of the habitat of this species; nor am I certain to whom I am indebted for the specimens. It is probable that I received them among other specimens of siliceo-fibrous sponges from my late friend, Mr. Henry Deane; and if so, its locality may be the same as that of *D. virgultosa*; and I have a strong suspicion that the remains of the sponge in course of description should be referred to that species. The skeleton-structure is identical with that from the solid stem of *D. virgultosa*, which may very probably have been the stem of a perfect specimen of *D. favoides*, presuming that sponge to have been cup-shaped and elevated on a pedestal. I have three fragments of *D. favoides*, apparently from the same individual, neither of which exceeds three lines in diameter; and they exhibit very faint traces of curvature; so that if they have been portions of a cup-shaped sponge, it must have been of considerable size—and are probably portions of its distal margin, as the pieces all agree in their general character, and no indications of approximation to the base of the cup is apparent in either of them.

In the specimen of *D. virgultosa* the fibres of the rete of the stalk-like specimen are rather stouter than those in *D. favoides*; but in other respects there is a remarkably close similarity. If the former should hereafter prove to have been the stalk or pedestal of a cup of the latter species, this slight difference might naturally be expected to occur.

Another strong indication of the close alliance of the two species exists in the peculiarities of their sarcode, which in both is extremely dark and opaque. In *D. favoides* it is very abundant; but a very small portion remains attached to the small fragment of *D. virgultosa* in my possession.

Under all the circumstances of the case I have thought it advisable to designate them as separate species, until further information enables us to decide the question.

FARREA INERMIS, Bowerbank. (Plate LVI. figs. 3, 4.)

Sponge cup-shaped? Dermal surfaces furnished with a quadrilateral, smooth, or rarely incipiently spinous siliceo-fibrous network, rarely armed at its angles externally with short, stout, imbricated, conical, spicular defences. Areas square or slightly oblong, regular; sides of the areas very rarely armed with long and slender acutely conical spines. Fibres of the dermal rete cylindrical, nearly equable in diameter, canaliculated irregularly. Dermal membrane thin and pellucid, aspiculous. Internal skeleton—rete indistinct and very irregular; fibres slender, occasionally slightly furnished with minute conical spines; gemmules spherical, smooth, membranous, aspiculous, dense and opaque.

Colour, in the dried state, dark amber.
Hab. West Indies? (*Captain Hunter*).
Examined in the dried state.

I received the only specimen of this sponge that I have seen, from my late friend Mr. Henry Deane, among several other species of siliceo-fibrous sponges, without any special account of its locality;

but as it was accompanied by several others obtained by Captain Hunter from the West-Indian Seas, I think it is highly probable that is is from the same locality. It is a fragment, eight lines in length by six in width, of a thin plate of sponge. It is slightly curved at right angles to the primary fibres of the skeleton, which radiate slightly from one end of the sponge; and from these indications it is probable that it has formed a portion of a cup-shaped sponge, and probably a rather widely expanded one. A few patches of the dermal membranes remain adhering to the skeleton-fibres; they are thin and delicate in structure, and many of them are slightly coated with dark amber-coloured sarcode, and not the slightest remains of retentive or other spicula could be detected upon any of them.

The primary fibres of the skeleton run in nearly parallel lines in the direction of the greatest length; and the secondary ones are disposed at right angles to the primary lines, causing the areas of the skeleton-rete for the greater part to be uniformly square, comparatively a few only being slightly oblong. The secondary lines of the exterior and interior surfaces of the sponge are very slightly less in diameter than the primary ones; and there are straggling portions of an intermediate layer of fibres, which are few in number and very much more slender than any portions of the external layers. Both the primary and secondary lines of the two outer surfaces of the skeleton are very smooth; on some portions of their fibres no indication of spines can be detected, while on others the faintest possible indications of them are perceptible; but on some of the straggling intervening portions they are much more decidedly produced. On the external or inhalant surface of the sponge there are a few well-produced short stout imbricated conical spicular defences, based on some of the angles of the rete; but they are of comparatively rare occurrence, and I could not detect them on the inner or exhalant surface. There are also a few long slender conical defensive spines projected from the skeleton-fibres into the interstitial spaces of the sponge; but, on the whole, the armature of the skeleton-tissues is very meagre, and it requires a linear power of not less than about 100 to render these characters distinctly to the eye.

The canaliculation of the skeleton-fibres is very unequal and irregular; and they appear to be often projected in opposite directions; and their cæcoid terminations frequently pass each other without uniting.

Minute fragments of the interstitial membranes are seen adhering to some of the skeleton-fibres; they are thin and delicate in structure; and some of them are slightly coated with dark amber-coloured sarcode; and not the slightest remains of retentive or other spicula could be detected upon any one of them.

The gemmules appear to have been very abundant in this sponge, as there are several groups of them attached to the skeleton-fibres, each containing a considerable number closely packed together. They are membranous and smooth, and apparently aspiculous, but so opaque that their contents cannot be seen. They vary slightly in size; their average diameter measured $\frac{1}{1200}$ inch.

I have compared the structures of this sponge with other nearly allied species without being able to assign it to any one of them. From the paucity of its armature I have designated it, specifically, *inermis*.

FARREA PERARMATA, Bowerbank. (Plate LVII. figs. 1, 2.)

Sponge cup-shaped? Surface even. Oscula and pores unknown. Dermal system reticulated; primary and secondary fibres cylindrical, disposed at right angles to each other. Areas of the rete mostly quadrilateral, occasionally oblong; fibres profusely furnished with minute conical spinules; canals of the fibres obsolete; areas of the rete frequently furnished at their angles, both at the external and internal surfaces of the inhalant surface, with large imbricated conical defensive organs, frequently terminated with rectangulated sexradiate organs of defence; also with numerous separate slender rectangulated sexradiate defensive organs and single long and slender spinulated spines, based on the skeleton-fibres, and occasionally with rather long and slender attenuated spines based on the fibres between their angles in cruciform arrangement. Nearly all the defensive organs more or less spinulous.

Colour unknown.

Hab. West Indies (*Captain Hunter, R.N.*).

Examined in the dried state.

The only specimen I have seen of this sponge is a fragment of what has apparently been a portion of a very delicate siliceo-fibrous cup. It is seven lines in length and five lines broad. I am indebted to my friend, Mr. J. Deane, for my possession of it. It was received, with other siliceo-fibrous specimens of Sponges, from Captain Hunter by my late friend, Mr. Henry Deane, of Clapham. The fragment is slightly curved in one direction, inducing the belief that it has formed a portion of the sides of a rather expansive cup-shaped sponge.

There are not the slightest remains of either membranous structures or of sarcode on any part of the well-washed specimen. The skeleton of the sponge only remains; but this is fortunately remarkably characteristic.

The primary and secondary lines of the skeleton are nearly or quite equal in size, and they are generally disposed at right angles to each other, so that the areas are usually square or more or less oblong. All parts of the skeleton-rete are profusely and rather regularly furnished with minute conical spinules; and not the slightest indication of the presence of central canals could be detected in any part of the skeleton-structures.

The angles of the skeleton-rete, both externally and internally, are frequently armed with stout imbricated conical defensive spines, which are occasionally terminated by slender more or less perfect rectangulated sexradiate defensive organs, which are rarely quite smooth, but more frequently amply supplied with minute conical spinules. The rectangulated sexradiate defensive organs are also often projected from the skeleton-fibres without the intervention of the large imbricated spines, and they are then generally based on the skeleton-fibres at some point between two of the angles of the skeleton-rete. In other cases four long slender spines are projected in opposite directions from the skeleton-fibres, so disposed as to form a symmetrical cross. In fact, there appears to be no end of variations in the form and mode of disposition of these defensive organs; and they are at the same time exceedingly numerous and very irregularly distributed. At some parts they are disposed singly at intervals, while in other parts a considerable number are congregated within a small space.

Although the discriminative characters in the specimen of this sponge are in this instance so few in number, they are fortunately so striking, and so different from those of other nearly allied species, that there will be little difficulty hereafter in recognizing the species in a more perfect condition by the peculiar specific characters afforded by the skeleton and its elaborate system of armature.

FARREA IRREGULARIS, Bowerbank. (Plate LVII. figs. 3, 4.)

Sponge laminar, cup-shaped? Surface even. Oscula and pores unknown. Dermal membrane thin, aspiculous. Skeleton siliceo-fibrous; fibres cylindrical, irregular in size; rete occasionally rectangulated, but more frequently irregular; central canals very slender, often obsolete. Interstitial defences rectangulated sexradiate, few in number, very small. Sarcode dark, opaque, aspiculous.

Colour, in the dried state, dark amber.

Hab. Algiers (*Mr. Henry Deane*).

Examined in the dried state.

The only specimen that I have seen of this species is a thin plate of it, eight lines in length by five in breadth, which, from its slight curvature in one direction, has apparently formed part of a cup-shaped sponge. I am indebted to my friend Mr. Charles Tyler for it; and he informed me that it was presented to him by our late friend Mr. Henry Deane, and that its habitat was Algiers.

The structures of the dermal surface are even, but much complicated; and the intervening skeleton-tissues to a great extent have the same character.

A few very minute portions of the dermal and interstitial membranes remained, upon each of which there is a thin film of dark amber-coloured sarcode; but I could not, with a power of 100 linear, discover the slightest remains of retentive or defensive spicula upon any of them. Small irregular dense masses of opaque sarcode are adherent to some portions of the interstitial skeleton; but they also appeared to be quite destitute of retentive spicula.

The configurations of the skeleton of both the inhalant and exhalant surfaces are very irregular in the mode of the disposition of their skeleton-structures; and the fibres also of which they are composed are very unequal in size. For small spaces the rete sometimes assumes a quadrangular form; but the more general mode is very irregular.

The skeleton consists of several layers of reticulate structure; but the intermediate portions between the inhalant and exhalant surfaces are so completely intermingled that it cannot be determined with certainty how many of them there are. The fibres also of which they are composed are very variable; some of them, and especially the largest ones, are nearly quite destitute of minute spinules, while others of small diameter abound in them in an incipient state of development. The central canals of the fibres are also very irregularly developed: in some parts they are obsolete; in others they are visible, but are of extreme tenuity; they rarely appear continuous for any distance; and frequently they terminate abruptly. The same irregularity is apparent with the interstitial defensive organs. A few single slender small attenuated spines are observable on the fibres of the skeleton, disposed at considerable distances from each other; they are very variable in size and mode of disposition. A few rectangulated sexradiate defensive organs are also present at considerable intervals. They are mostly very minute, requiring a power of about 200 linear to render them distinctly to the eye; and if of larger dimensions, they are often abnormal and distorted in form.

The prevailing irregularities in the structure of this species, in addition to the more positive specific characters, will readily separate it from other nearly allied species with which we are acquainted.

EXPLANATION OF THE PLATES.

Plate LVI.

Fig. 1 represents a portion of one of the pieces of *Deanea favoides*, exhibiting the dark sarcodous development of the skeleton on one part, and the denuded rotulate skeleton on the other portion, ×36 linear.

2. A small portion of the confluent rotulate skeleton of the specimen represented by fig. 1, showing the structure of the rotulæ and the central canals of the fibre, ×80 linear.

3. *Farrea inermis*: a portion of the skeleton, exhibiting its general structure and the paucity of its armature, and a small piece of its membranous structure, with numerous gemmules embedded upon it at *a*, ×36 linear.

4. The group of gemmules represented at *a*, fig. 3, ×80 linear.

Plate LVII.

Fig. 1 represents a portion of the skeleton of *Farrea perarmata*, with the manner of the disposition of its abundant armature, ×61 linear.

2. A small portion of the specimen represented by fig. 1, exhibiting the structure of the defensive organs, ×123 linear.

3 represents a portion of the skeleton of *Farrea irregularis*, exhibiting the intricate and irregular structure of its rete, ×31 linear.

4, *a*, *b*, *c*. Examples of the varieties in size and of the distortions of form of the interstitial sexradiate defensive organs, ×123 linear.

3. Catalogue of a Collection of Spiders made in Egypt, with Descriptions of new Species and Characters of a new Genus. By the Rev. O. P. Cambridge, M.A., C.M.Z.S., and Hon. Memb. New-Zeal. Institute.

[Received May 31, 1876.]

(Plates LVIII.–LX.)

Since the time of Savigny, who, in conjunction with Audouin (A.D. 1809–13), figured and described about eighty-four species of Araneidea in his great work on Egypt, very little has been done in this particular branch of Egyptian zoology. The chief, if not all, of the later additions to the known Spiders of those regions are several species of Drassides (a portion of the present collection) published in the 'Proceedings' of the Zoological Society, 1872, pp. 224–247, and nineteen others of the same family and collection, likewise published in the Zoological Society's 'Proceedings,' 1874, p. 370 *et seq.* Dr. Ludwig Koch also records and describes, in 'Ægyptische und Abyssinische Arachniden,' Nürnberg, 1875, nineteen species of Araneidea, found near Cairo by Herr C. Jickeli. Egyptian entomology in general appears to have received comparatively little attention, considering the great number of tourists and naturalists who have visited the Nile during the last fifteen or twenty years. Probably this has arisen in a great measure from the superior attractions offered by the birds of that rich ornithological region; a strong and very decided love of Insects and Arachnids would be required to make these more attractive to most travellers than the numerous feathered tribes. There are regions of the world where the size, the number, and the beauty (or ugliness, as it may be) of the Insect and Arachnid orders almost oblige the most indifferent observers to note and collect them; but Egypt is decidedly not such a region. We have a strong proof of this in a lately published lecture on the Rambles of a Naturalist in Egypt, by Mr. J. H. Gurney, jun.; a notice before me of this lecture says, "Mr. Gurney briefly alluded to the entomology of the country, which appears to consist of fleas, flies, and mosquitoes." It would argue a tough skin, and indifference to entomology indeed, were a naturalist, or any other traveller, to pass over these without notice, so very close and persistent are their attentions; and perhaps more attention would be paid to entomology (in a wider sense) were their attentions rather less pertinacious. As it is, however, the "fleas, flies, and mosquitoes" are numerous and persistent enough to make it impossible to escape them, while others of this class (Spiders included) are comparatively scarce, and, generally speaking, so little attractive, from their usually small size and sombre colouring, as to require close observation and careful search to obtain any thing like a fair representation of their indigenous forms. Still any naturalist with good health and a love of the subject would find ample reward for any real work among the Insects and Spiders of the Lower Nile basin. My own work there during about eleven weeks, between the middle of January and the middle of April 1864, from Alexandria to Assouan, resulted in a collection of several hundred species of Insects of all orders, besides the 164 species of Spiders contained in the present list, as well as some few Acaridea and Scorpionidea. Rather more than one third of the Spiders belong to the two families Drassides and Salticides, these being also the two families even more numerously represented, absolutely as well as proportionally, in Syria and Palestine than in Egypt (see P. Z. S. 1872, p. 214). In those countries they comprise 117 species, or nearly one half of the Araneidea met with, while the numbers found in Egypt are 56. The dry and desert nature of both Palestine and Egypt are alike favourable to the development of the Drassides and Salticides; and many of the species are common to both countries. Suffering a good deal from climatic influences, I was unable to work very hard. Except for this and some other reasons, I feel no doubt but that the number of Spiders in my collection would have been nearly, if not quite, doubled; and if so, it is evident that there remains yet much to be done in order to exhaust the Egyptian species of this order. Of the total (164 species), 91 appeared to be new to science; 62 of these are now described for the first time, while the remainder (principally, as before mentioned, of the Drassides and Salticides) have been already described, P. Z. S. 1872 and 1874. One Spider alone in the collection appears to require the formation of a new genus for its reception, see p. 596. This Spider is of the family Lycosides, and is allied to the genus *Dolomedes*; it was found in a swamp near the canal about three miles from Alexandria.

Comparing the numbers of genera and families with those found in Syria and Palestine, their very near similarity is remarkable. 19 families, comprising 59 genera, are the numbers in the latter district, while those of Egypt are respectively 17 and 60. In the present list, however, the Latreillian genus *Salticus* is divided into eight generic (or subgeneric) groups; if this had been also done in the Palestine list, the number of genera would have been there 66 instead of 59; but even then the totals are remarkably near to each other. Comparing these results with those I have obtained in Great Britain (at present one of the best-, or perhaps the best-worked European district in respect to the Araneidea), we find here 78 genera distributed among 14 families, 4 South-European families being unrepresented. This comparison might have been extended to the results obtained in Sweden by M. Westring and Dr. T. Thorell, as well as in Italy by Dr. P. Pavesi, and in Algeria by Mons. H. Lucas; but it seems best at present to confine it to those results obtained by, as nearly as possible, an identical system of generic and family limitation, since a difference of system would necessarily produce a different result in regard to the numbers of families and genera. I should have liked to have been able to make a more certain collation of the Egyptian Spiders with those of

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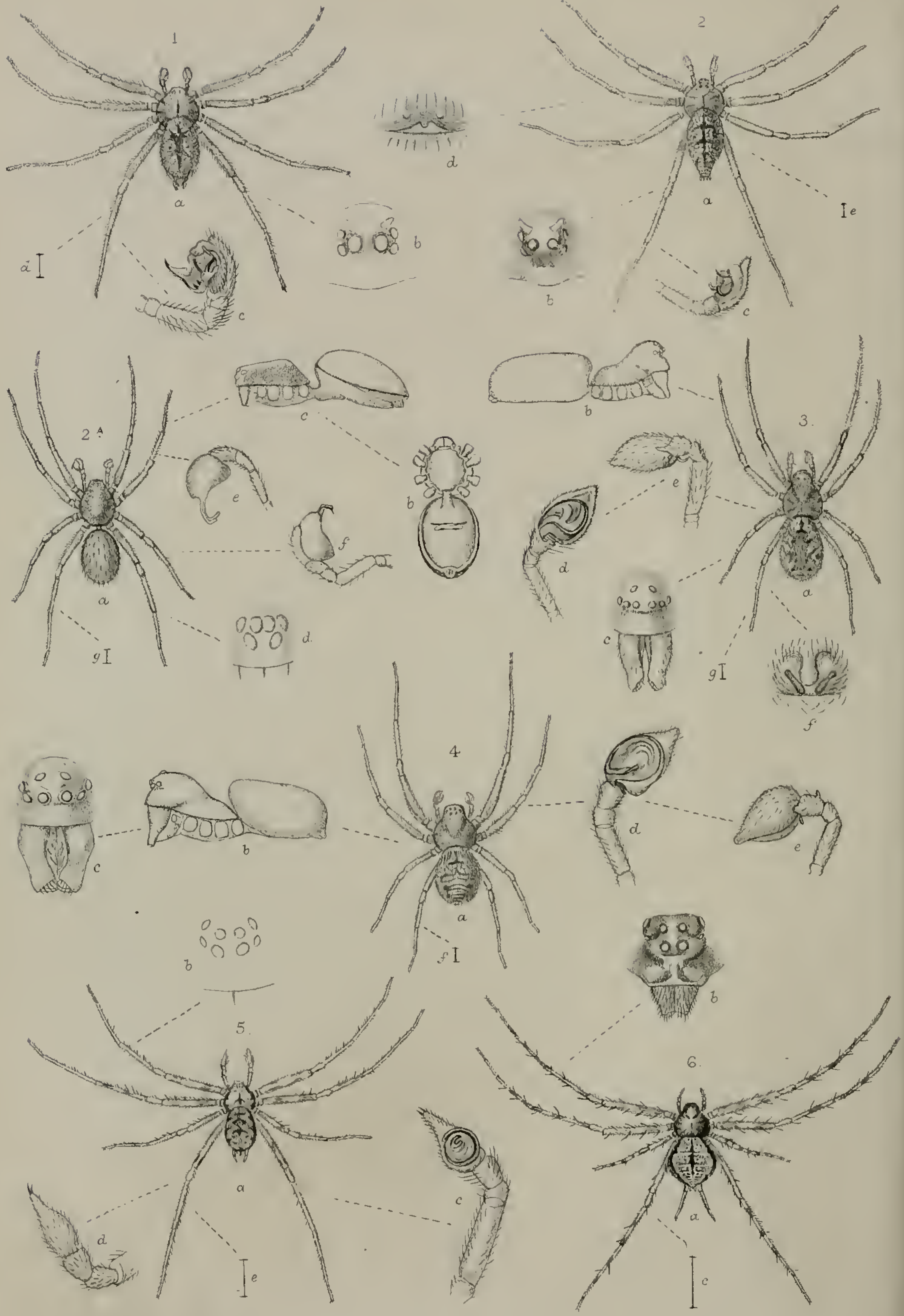
P. Z. S. 1876. Pl. LVIII.



A. T. Hollick del. et lith.

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Egyptian Spiders.

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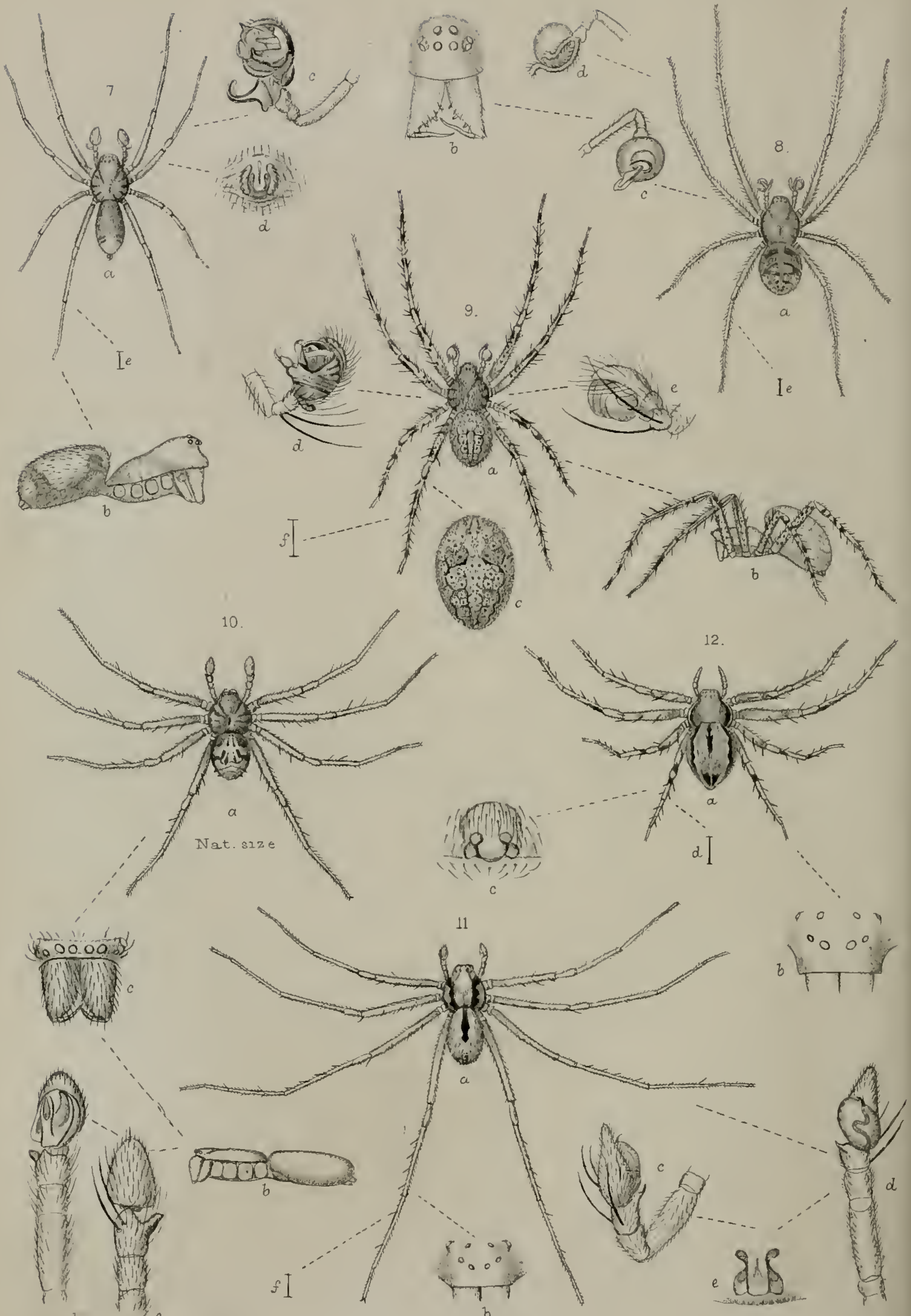
P.Z.S. 1876. Pl. LIX.



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Egyptian Spiders

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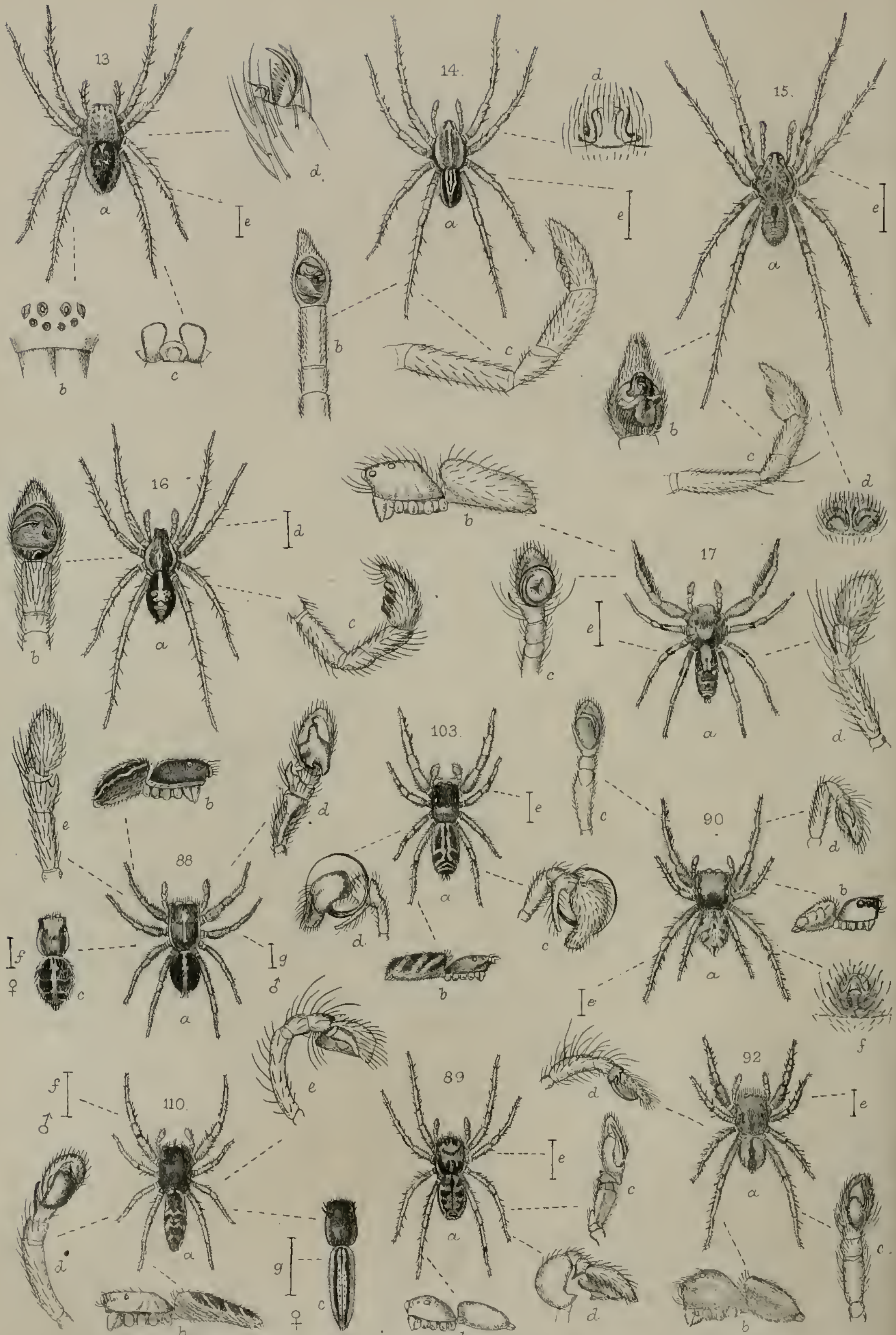

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Egyptian Spiders.

Algeria, inasmuch as, from the nature of their geographical and physical conditions, the faunas of Egypt and Algeria must have very much in common; my collection, however, of Algerian Spiders is too scanty for this purpose, and I have not been able to get access to any others. So far as I can make out with tolerable certainty, about eighteen species only of the following list appear to be identical with species found in Algeria. The determination, however, of closely allied species by means of descriptions and figures alone is very uncertain work; and thus I have in many cases hesitated to determine, from these alone, their synonymic identity. And so, again, in some instances I may perhaps have described as new, species already described by M. Lucas in his great Algerian work; but this, of the two, appears to me a less evil than that of including, as synonymic, species not certainly identified as similar.

A list is added to this paper of those Egyptian Spiders, so far as I have been able to ascertain them, not found by myself, but described and recorded by other authors. This considerably swells the number of known species, but adds nothing to the numbers of indigenous families and genera contained in my own list. Thus the total number of Egyptian Araneidea known to the present time appears to be 226.

Out of the 164 species found by myself, 29 are identical with species described and figured by Savigny and Audouin, and the numbers (of species of all genera) common to Egypt and Palestine are 48.

Order ARANEIDEA.

Family Filistatides.

Genus Filistata (Latr.).

Filistata testacea.

Filistata testacea, Latr. Considérations, p. 12; Cours d'Entomologie, p. 512.

F. attalica, Koch, Die Arachn. v. p. 6, pl. 146. fig. 343; Cambr. Spid. Palest. & Syria, P. Z. S. 1872, p. 216.

Adult females and a single adult male of this species were found in crevices of the bark of palm and other trees, and in the interstices of old walls, near Alexandria and in several other parts of Egypt.

The Spider recorded P. Z. S. *l. c.* is, I think, of the same species as the one here noticed. At the time of drawing up the list of Palestine Spiders I had some doubts on this point; but at present I consider them to be identical with each other, as well as with *F. attalica*, Koch, and *F. testacea*, Latr. *F. bicolora*, Walck., is also probably identical with these.

The calamistrum on the metatarsi of the fourth pair of legs differs from that of other Spiders possessing it, both in extent and position. In the present species it consists of a few strong curved spine-like bristles in a longitudinal series, situated on a sharpish ridge, a little depressed, close to the hinder extremity on the inner side of the joint. The inframammillary organ, although present, is not easily seen at first, owing to the numerous and strong hairs with which it is concealed.

Filistata puta, sp. n.

Adult female, length $2\frac{1}{2}$ lines (nearly).

This Spider is very nearly allied to *F. testacea*, Latr., but differs from it in the whole of the fore part (including the legs and palpi) being of a clear straw-yellow colour. The *cephalothorax* has no dark margins; nor is there any dark longitudinal band on the hinder part of the caput, nor on each side of the clypeus, as in *F. testacea*; the legs also are quite immaculate. The colour of the abdomen is a dull yellow, slightly tinged with brown. If the specimen here described be of the normal adult size, it is also a much smaller species than *F. testacea*. The eyes of the hind central pair are smaller in proportion to the hind laterals than in that species; otherwise their position and relative size are very nearly similar.

An adult and immature females were found in interstices of walls at Alexandria in April 1864.

Gen. Œcobius, Luc.

Œcobius putus, sp. n. (Plate LVIII. fig. 1.)

Adult male, length $1\frac{3}{4}$ line.

In colours and general appearance this Spider is very similar to *Œ. templi*; but it is larger, and the legs have on the metatarsi and tarsi (of the fourth pair at least) several distinct and tolerably strong prominent spines. The eyes are not so large. The interval between those of the central pair (which are the largest of the eight) is equal to an eye's diameter; and the two posterior flattened angular eyes are much smaller. The armature also of all the femora is of a much more spinous character. The abdomen is more thickly covered with white cretaceous spots; and the cruciform marking on the upper side is better defined, though of a similar character. The palpi are thickly furnished with fine pale hairs; the digital joints are much larger than those of *Œ. templi*, and the palpal organs more prominent and developed. Their structure, although on the same general plan, is distinctly different in the development of their processes. From *Œ. domesticus* it may also be distinguished by its larger size and the structure of the palpal organs, as well as by the other marks noted above.

An adult and three immature males, as well as two immature females, were found under small sheets of web on the walls of one of the temples of Upper Egypt, between Denderah and Assouan; but having lost the notes made at the time, I cannot be certain as to the exact locality.

The females had all the leg-armature, including the calamistrum, rubbed off against other specimens in the bottle of spirits in which they came home; but the inframammillary organ is plainly visible both in the females and males.

Two adult males and ten females were found among the ruins of the Temple of Philæ, in Upper Egypt, where they were concealed under small sheets of web spun in the angles and superficial inequalities of the columns and walls.

Œcobius templi, sp. n. (Plate LVIII. fig. 2.)

Adult male, length 1¼ line.

This plainly coloured Spider is nearly allied to *Œcobius domesticus*, Lucas, from which it may be distinguished by the much smaller size of the digital joint of the palpus and palpal organs and the different structure of the latter; the eyes also are larger in proportion and more closely grouped together.

The general form and appearance of this species is similar to that of all the other known species. The *cephalothorax* is pale yellow, thinly clothed with hairs, a fine irregular blackish line runs back from each of the two hindermost eyes; and the two lines converge into a single one at the thoracic junction; the impression by which this junction is marked is large and roundish.

The *eyes* are in the ordinary position, and may be either described as in two lateral, longitudinal, curved rows of three each, between which, towards the fore side of the area thus enclosed, are two others (central ones) in a transverse line; or else they may be described as in the usual position of two transverse curved rows of four each; perhaps it will be most convenient to speak of them, in regard to their relative size and situation, as in the former position: the two central eyes are largest of the eight and are separated from each other by less than a diameter's interval, each being near but not contiguous to the foremost eye of the lateral row, on its side; the posterior eye of each lateral row is flattened, obliquely placed, and of an elongated curviangular form (the base of the triangle being in front), and each is contiguous to the next eye of the same row; the interval between the angles of the two posterior eyes nearest to each other is about equal to the base of each of these eyes.

The *legs* are rather long and slender, of a tapering form and pale yellow colour, but not greatly differing in length, their relative length appearing to be 4, 3, 2, 1, ? and they are sparingly furnished with hairs of varied length, but no spines properly so called.

The *palpi* are not very long, but strong, and similar in colour to the legs, the palpal organs giving a yellow brown hue to the digital joint; the radial as well as cubital joints are short, and devoid of projections or apophyses; the digital joint is large, though less than that of *Œ. domesticus*, Luc.; the palpal organs are prominent and have some strong processes directed backwards and inwards: these processes although of a different form and less developed than those of other species, require a good magnified drawing to show their differences; no description could do this.

The *falces* are rather short, slender, and vertical; their colour is similar to that of the cephalothorax.

The *maxillæ*, *labium*, and *sternum* are of normal form and character; and their colour is similar to that of the legs.

The *abdomen* is oval and (looked at in profile) higher at its anterior than at its posterior extremity; it is rather depressed, and projects considerably over the base of the cephalothorax; its colour is a dull testaceous yellow covered with irregular cretaceous white spots, leaving, however, near the fore half of the upperside, a tolerably well-defined longitudinal central cruciform dull brownish marking; the shaft of the cross tapers to a point posteriorly, near which, generally, an oblique line goes off on either side; the spinners are normal; in front of the usual six is an inframammillary organ similar to that of other spiders whose females, like the present, have a calamistrum on the metatarsi of the fourth pair of legs; the anus has the same curious fringe as other species of this and the allied genus (*Uroctea*, Duf.).

The female resembles the male in general characters, but is rather larger, and often has two or more indistinct brownish spots on the hinder part of the abdomen; as above mentioned, the metatarsi of the fourth pair of legs has a calamistrum, or series of curved bristles, concluded to be intended for carding the silk emitted from the inframammillary organs. Mons. Eugène Simon (Les Arachnides de France, ii. p. 6) doubts the existence of these organs, and of the calamistrum, in this genus, or at least significantly remarks that he has been unable to discover them in any species he has examined. I do not, however, feel the smallest doubt that these characters will be found in all the species—*both* in the females, *one* (inframammillary organ) at least in the males. The hairs on the legs of these Spiders (together with those of the calamistrum), appear to be more easily rubbed off than in most other Spiders; and hence several females of this species have no hairs or bristles on the legs at all. Possibly M. Simon has only met with examples whose legs have accidentally been denuded of their armature. Undoubtedly a female of *Œcobius domesticus*, Luc., sent me from Tangier by M. Simon himself, has a calamistrum well marked on one of the posterior legs, but no trace of any on the other. The bristles forming this organ are proportionally longer and slenderer than in many other spiders similarly armed. The inframammillary organ, although narrow and, like that of other spiders, only just elevated above the surrounding surface, is yet, I think, unmistakable in both sexes of all the species known to me (ten in number). M. Simon thinks that I have mistaken a mere transverse fold of the skin for it; if he will, however, examine this fold under a strong magnifier, I think its mammillary nature will be sufficiently evident.

ŒCOBIUS ANNULIPES.

Œcobius annulipes, Lucas, Explor. en Algérie, vol. iv. p. 102, pl. ii. fig. 2.

A single adult female of this Spider was found under a stone in Upper Egypt.

Gen. UROCTEA, Duf.

UROCTEA LIMBATA.

Clotho limbata, C. Koch, Die Arachn.

An adult male and several females were found under stones at Alexandria in April 1864.

M. Simon (Les Arachnides de France, ii. p. 5) states that *U. durandi*, Walck., is also found in Egypt; I did not, however, meet with it myself there, though I found it shortly afterwards in the crevices of old olive-trees at Corfu, whence it could only be extracted by inserting a piece of stick, jagged at the end, into the crevice, and twisting it into the strong silken nest, when the whole with its occupant could now and then be drawn safely out.

Gen. ARIADNE, Sav.

ARIADNE INSIDIATRIX.

Ariadne insidiatrix, Savigny, Egypte, p. 109, pl. i. fig. 3.

An adult female among débris of an old mud wall near Cairo, in January 1864.

Gen. DYSDERA, Latr.

DYSDERA LATA.

Dysdera lata, Reuss-Wider. Mus. Senckenb. tom. i. p. 201.

Several examples which, after careful examination, I believe to be of this species, were found under stones at Alexandria in April 1864. None of these examples were adult; this determination, therefore, cannot be considered absolutely certain, since there are several nearly allied species, such as *D. crocota*, C. Koch, and *D. maurusia*, Thor., of which the immature examples appear almost to defy certain determination.

Gen. OONOPS, Templeton.

OONOPS SCUTATUS, sp. n. (Plate LVIII. fig. 2 A.)

Adult male, length 1¼ line.

This Spider is very closely allied to *Oonops loricatus*, Sim.; it is, however, larger, the measurement of that species (taken from two examples kindly sent to me by M. Simon) not exceeding three fourths of a line in length; the abdomen of the present spider is also of a rather narrower form, but more convex above, and far more glossy and polished on its upper surface, while in colours and some other characters there is but little apparent difference.

The *cephalothorax* is oval, strongly constricted laterally at the caput; the thoracic junctional point is (looked at in profile) of an angular form, and elevated above the level of the rest of the cephalothorax, the hinder slope being abrupt; it is of a bright orange-brown colour; and the sides and hinder part are thickly covered with minute tubercles or granulosities, which in some positions assume the appearance of punctures.

The *eyes* are large, six in number, closely grouped together, and occupy nearly the whole of the upperside of the fore extremity of the caput, where they form a quadrilateral figure whose foremost side is considerably shorter than the hinder one; they do not differ much in size, and are all of a more or less oval shape; those of the hind central pair are closely contiguous to each other, their sides of contact being flattened and so closely joined as almost to conceal the junction. The eyes of each lateral pair are very near together, but not quite contiguous to each other, each fore lateral eye being also equally close to the hind central eye on its side, and each hind lateral eye still closer (almost contiguous) to the hind central nearest to it; the interval between those of the front row (or the fore laterals) is about equal to their longest diameter; the height of the clypeus, which projects a little at its lower margin, is rather less than half that of the facial space.

The *legs* are moderately long and strong, of a lightish orange-yellow colour; and their relative length appeared to be 4, 1, 2, 3; the femora are the strongest, especially at their posterior extremities, which are abruptly enlarged on the upperside close to the articulation, but run evenly thence to the anterior extremities; they are furnished, but not very thickly, with hairs; the tibiæ and metatarsi of the first and second pairs are armed beneath with a double series of long and strong sessile spines; the other two pairs of legs have bristles (or very slender spines) in a similar situation; each tarsus terminates with two curved claws springing from a distinct supernumerary claw- (or heel) joint.

The *palpi* are short and not very strong; their colour is yellow, paler than that of the legs; and they are furnished with hairs and bristles; the cubital and radial joints are short, the former is bent downwards, the latter is rather the longest and strongest; the digital joint is narrow, tapering from the middle to the fore extremity, and no broader than, but almost double as long as, the radial; the palpal organs consist of a very large and prominent oval yellowish lobe with a largish curved, pale brownish yellow, pointed process at its anterior extremity.

The *falces* are moderately long, but not very strong, directed backwards towards the labium, furnished in front with bristly hairs, and similar in colour to the cephalothorax.

The *maxillæ* and *labium* are of normal form, the latter being rather large; these parts, with the *sternum*, are similar to the legs in colour.

The *abdomen* is of an oval form, moderately convex above, and covered both above and below (like *O. punctatus* Cambr., and *O. loricatus*, Sim.) with a bright reddish yellow-brown somewhat corneous scutum, the approximate edges, according as they are more or less separated, showing a greater or less interval of pale yellowish membranous integument. It appears, from observations made by M. Simon, "Aranéides nouv. ou peu connus du midi de l'Europe," Mém. Liége, 2^{e} sér. t. v. p. (sep. cop.) 45, that the Spider he describes has the power to bring the edges of this supra-abdominal and subabdominal scutum together, or to separate them, at will; the spiracular plates are continuous with each other, and, extending forwards, cover the pedicle by which the abdomen is connected with the cephalothorax; this pedicle is longer and more distinctly developed than in most other Spiders; the upper scutum is very highly polished and glossy, and it is thinly but evenly covered with minute tubercles, each of which supports a fine bristly hair: the spinners are short and inconspicuous; they are enclosed below by a narrow reddish yellow-brown semicircular band of a similar nature to the scutum with which the abdomen is covered. When the edges of the upper and lower scutum are brought together, they enclose and conceal the spinners. The spiracular openings are four in number, the two extra ones being smaller than the others and situated one close behind each of the two ordinary openings; M. Simon, *l. c.* pp. 41, 42, says that he has been unable to discover these extra openings in any species of *Oonops* that has come before him; they are, however, plainly visible in the two examples of *O. loricatus* which I received from him, though less plainly in *O. punctatus* Cambr. In the type of the genus, *O. pulcher*, Templ., owing to the minuteness of the Spider, and (after it has been some time in spirit of wine) pale colour of the abdomen, the hinder spiracular openings are very difficult to be seen; indeed in some examples I am quite unable to detect them; in one or two, however, I can discern them sufficiently to be quite convinced that the species possesses them; only, being the merest possible slits, they cannot in general be seen with an ordinary lens. It would be strange indeed if they were really wanting in *O. pulcher*, while so unmistakably present in *O. scutatus*, and *O. loricatus*, as well as in the species next described (*O. pauper*), which last is very nearly allied to *O. pulcher*, and in another undescribed species allied to *O. scutatus*, received from Ceylon; all these Spiders are, as it appears to me, generically quite identical.

Three examples of *O. scutatus* (one male and two females) were found by myself under stones near Alexandria in April 1864.

OONOPS PAUPER, n. sp.

Adult female, length $1\frac{1}{3}$ line.

The cephalothorax, falces, maxillæ, labium, and sternum of this Spider are of a dull orange-yellow colour, the legs and palpi being pale straw-yellow, and the abdomen dull whity brown.

The *cephalothorax* is short, broad behind, and strongly constricted laterally at the caput; the normal indentations are tolerably strongly marked; and the height of the clypeus is equal to half that of the facial space; the highest point (looked at sideways) is at the thoracic junction, whence it runs by an evenly curved slope to the clypeus, the hinder slope not being very abrupt; the clypeus is furnished with some minute tubercles, each of which was probably furnished with a bristly hair; but if so, these had been rubbed off before this description was made.

The *eyes* are large, seated on black tubercular spots, and occupy the whole width of the fore part of the caput; their position is the same as that of those of *O. pulcher* (Templ.), but they are far more circular in shape; the hind lateral and central eyes form a slightly curved row, whose convexity is directed forwards; those of the central pair are as nearly as possible contiguous to each other; and each is separated by rather less than its diameter's distance from the hind lateral nearest to it; the hind laterals have a strong sideway and backward direction, and each is very near, but not quite contiguous to its fore lateral eye; the interval between the fore laterals is equal to very nearly two diameters; those of each lateral pair are placed obliquely, and are rather smaller than those of the central pair.

The *legs* are rather long and slender, except the femoral joints; their relative length appears to be 4, 1, 2, 3. Whatever their armature may have been, it was entirely rubbed off before this description was prepared.

The *palpi* are rather long, slender, and similar in colour to the legs; the digital joint is cylindrical and exceeds in length the radial and cubital joints together.

The *falces* are long, tolerably strong and straight, but strongly directed backwards to the labium; and their front surface is thinly covered with minute, and probably pilose, reddish brown tubercles.

The *maxillæ* and *labium* are forced backwards into a direction perpendicular to the sternum, owing to the strong backward direction of the falces. Their form is thus very difficult to be ascertained, but it appears to be similar to that of the other species of this genus.

The *abdomen* is short, oval in form, considerably convex above, and does not project over the base of the cephalothorax; the connecting pedicle being distinct. Four spiracular springs are plainly visible, the two extra ones being placed not far behind the ordinary pair. The spinners are short; those of the inferior are much the strongest. A single example was found under a stone at Alexandria in April 1864.

Fam. DRASSIDES.

Gen. GNAPHOSA, Latr.

GNAPHOSA PLUMALIS.

Gnaphosa plumalis, Cambr. Proc. Zool. Soc. 1872, p. 225, pl. xv. fig. 3.

An adult male of this Spider was found under a stone at Alexandria.

GNAPHOSA CONSPERSA.

Gnaphosa conspersa, Cambr. Proc. Zool. Soc. 1872, p. 230. pl. xv. fig. 5.

An adult male and female, besides immature examples of both sexes, were found under stones near the pyramid of Ghizeh.

GNAPHOSA PROCERA.

Gnaphosa procera, Cambr. Proc. Zool. Soc. 1874, p. 373, pl. i. fig. 2.

This Spider is very similar in size, general form, structure, colours and markings to *G. conspersa*, but may be readily distinguished by the special form and structure of the palpi and palpal organs; examples of both sexes in the adult state were found under stones near Alexandria.

Gnaphosa marginata.

Gnaphosa marginata, Cambr. Proc. Zool. Soc. 1874, p. 374, pl. li. fig. 3.

A single adult female was found among the ruins of an old wall near Cairo.

Gnaphosa venatrix.

Gnaphosa venatrix, Cambr. Proc. Zool. Soc. 1874, p. 375, pl. li. fig. 4.

A single adult male of this Spider, which is nearly allied to *G. plumalis*, Cambr., was found at Alexandria. The form of the radial joints of the palpi will serve to distinguish it at once from its near allies.

Gen. Drassus, Walck.

Drassus mundulus.

Drassus mundulus, Cambr. Proc. Zool. Soc. 1872, p. 324, pl. xv. fig. 11.

An adult male and female were found among the ruins of an old wall at Cairo.

Drassus senilis.

Drassus senilis, Cambr. Proc. Zool. Soc. 1872, p. 236, pl. xv. fig. 13.

An adult female was found under a stone near Alexandria.

Drassus infumatus.

Drassus infumatus, Cambr. Proc. Zool. Soc. 1872, p. 238, pl. xv. fig. 16.

An adult example of each sex was found under the ruins of an old mud wall near Cairo.

Drassus ornatus.

Drassus ornatus, Cambr. Proc. Zool. Soc. 1874, p. 388.

A single example of the female was found under a piece of stone, near Alexandria.

Drassus campestratus.

Drassus campestratus, Cambr. Proc. Zool. Soc. 1874, p. 392, pl. li. fig. 17.

An adult male was found under a stone near Alexandria.

Drassus alexandrinus.

Drassus alexandrinus, Cambr. Proc. Zool. Soc. 1874, p. 393, pl. li. fig. 18.

A single adult male was found among the débris of an old wall near Alexandria.

DRASSUS ÆGYPTIUS.

Drassus ægyptius, Cambr. Proc. Zool. Soc. 1874, p. 394, pl. li. fig. 19.

An adult male and female were found under stones at Alexandria.

DRASSUS VULPINUS.

Drassus vulpinus, Cambr. Proc. Zool. Soc. 1874, p. 397, pl. li. fig. 22.

A single adult female was found in an old building at Cairo.

DRASSUS DENOTATUS.

Drassus denotatus, Cambr. Proc. Zool. Soc. 1874, p. 398, pl. li. fig. 24.

A single adult female at Cairo.

DRASSUS PUGNAX.

Drassus pugnax, Cambr. Proc. Zool. Soc. 1874, p. 399, pl. li. fig. 25.

An adult male was found among the débris of an old wall at Cairo.

Gen. PROSTHESIMA, L. Koch.

PROSTHESIMA LÆTA.

Prosthesima læta, Cambr. Proc. Zool. Soc. 1872, p. 241, pl. xv. fig. 19.

An adult male, together with an immature example of each sex, were found under stones near Cairo.

PROSTHESIMA PICINA.

Prosthesima picina, Cambr. Proc. Zool. Soc. 1872, p. 242, pl. xv. fig. 20.

An adult female under a stone near Alexandria.

PROSTHESIMA TRISTICULA.

Prosthesima tristicula, Cambr. Proc. Zool. Soc. 1874, p. 377, pl. li. fig. 6.

A single adult male was found under a piece of rock near Alexandria.

PROSTHESIMA CURINA.

Prosthesima curina, Cambr. Proc. Zool. Soc. 1874, p. 379.

An adult male, under a stone at Alexandria.

PROSTHESIMA NILICOLA.

Prosthesima nilicola, Cambr. Proc. Zool. Soc. 1874, p. 380, pl. li. fig. 8.

A single example of the adult male was found under a stone near Alexandria.

PROSTHESIMA MOLLIS.

Prosthesima mollis, Cambr. Proc. Zool. Soc. 1874, p. 381, pl. li. fig. 9.

An adult female under a stone near Alexandria.

PROSTHESIMA PALLIDA.

Prosthesima pallida, Cambr. Proc. Zool. Soc. 1874, p. 383, pl. li. fig. 11.

A single example of each sex in the adult state were found under stones near Alexandria.

PROSTHESIMA INAURATA.

Prosthesima inaurata, Cambr. Proc. Zool. Soc. 1872, p. 246, pl. xv. fig. 26.

An adult male and female were found under stones near Alexandria.

Gen. MICARIA, Westr.

MICARIA CINCTA.

Micaria cincta, L. Koch, Die Arachn.-Fam. der Drassid. p. 53, pl. iii. figs. 36, 37.

An adult of each sex under a stone at Alexandria.

Gen. CHEIRACANTHIUM, Koch.

CHEIRACANTHIUM DUBIUM, Cambr. Proc. Zool. Soc. 1874, p. 403, pl. lii. fig. 28.

A single adult male at Alexandria.

CHEIRACANTHIUM EQUESTRE.

Cheiracanthium equestre, Cambr. Proc. Zool. Soc. 1874, p. 404, pl. lii. fig. 29.

An adult example of each sex near Cairo.

CHEIRACANTHIUM ISIACUM.

Cheiracanthium isiacum, Cambr. Proc. Zool. Soc. 1874, p. 407, pl. lii. fig. 31.

Adults of both sexes on low plants in the neighbourhood of Cairo.

CHEIRACANTHIUM TENUISSIMUM.

Cheiracanthium tenuissimum, L. Koch, Die Arachn.-Fam. Drassid. p. 264, pl. x. figs. 161–163.

An adult female at Alexandria.

CHEIRACANTHIUM ANNULIPES.

Cheiracanthium annulipes, Cambr. Spid. of Palest. & Syria, P.Z.S. 1872, p. 254, pl. xvi. fig. 36.

An adult female at Cairo.

Fam. PALPIMANIDES.

Gen. PALPIMANUS, Duf.

PALPIMANUS HÆMATINUS ?

Palpimanus hæmatinus, C. Koch, Die Arachn. iii. p. 21, pl. 80. fig. 179.

A female, which I take to be perhaps of this species, was found in the neighbourhood of Alexandria in 1864 ; and it appears to be identical with examples found in Palestine in 1865. I have since, however, had occasion to doubt whether these are, or not, the true *P. hæmatinus* of C. Koch ; they are certainly different from a closely allied species which I found subsequently in Corfu and at Smyrna. This latter species may be the true *P. hæmatinus,* C. K., coming, as it does, nearly from the same region as the type of Koch's species. The Spiders of this genus are very nearly allied to each other, and are remarkably similar in their general characters and appearance ; and it will require a close comparison of their respective genital organs to determine the species with any certainty.

PALPIMANUS SAVIGNYI.

Platyscelum savignyi, Aud. in Sav. Egypte, p. 167, pl. vii. figs. 6, 7.

Two females, certainly distinct from that last noted, were found in ascending the Nile from Cairo to Thebes. My note of the exact locality has been mislaid ; but I feel little doubt that these are of the same species as that mentioned in the synonym above quoted.

Fam. ERESIDES.

Gen. ERESUS, Duf.

ERESUS PETAGNÆ.

Eresus petagnæ, Aud. in Sav. Egypte, pl. iv. fig. 11.

Adult and immature females of this species were found under stones near Alexandria. But for M. Simon's opinion ("Note sur la famille des Eresidæ," Ann. Soc. Ent. Fr. 5^e sér. tom. iii. 1873, p. 357), I should have considered this species to have been identical with *Eresus imperialis,* Duf. (= *E. frontalis,* Latr.)

ERESUS DUFOURII.

Eresus dufourii, Aud. in Sav. Egypte, p. 151, pl. iv. fig. 7.

Immature examples of this very distinct species were found on low plants on the edge of the desert above Assouan. I have received from Italy adults of both sexes of a species which I believe to be identical with the present. It is a small species, the adult male measuring only $2\frac{3}{4}$ lines in length, while that of the adult female is no more than 3 lines.

Fam. DICTYNIDES.

Gen. DICTYNA, Sund.

DICTYNA INNOCENS.

Ergatis innocens, Cambr. Spid. Palest. & Syria, P.Z.S. 1872, p. 262.

Adult male, length rather more than 1 line.

Females only of this distinctly marked species were found in Palestine; but a single adult male example of what I feel no doubt is of the same species, found on a low plant near Cairo, enables me now to give the distinctive characters of the latter sex.

In colours and markings both sexes are alike. The *cephalothorax* of the male is of a dark yellowish-brown colour, thinly clothed with coarse hoary hairs; the caput is strongly elevated and well rounded; the clypeus projects considerably forwards, and its height exceeds half that of the facial space.

The *eyes* are in the usual position; those of the fore central pair are nearer together than each is to the fore lateral eye on its side.

The *legs* are moderate in length and strength; their relative length is 1, 2, 4, 3. They are of a dull yellow colour, faintly banded with brown, and clothed with coarse hairs, of which many are of a hoary colour.

The *palpi* are of a dull pale yellow colour; the radial and cubital joints are short, but about equal in length; and from the upperside at the hinder extremity of the former there is a small thorn-like blackish spine directed forwards; the digital joint is large and broad; the palpal organs are simple, and surrounded by a strong black spine, which arises from their base on the inner side, and terminates in a fine point near their base on the outer side.

The *falces* are of moderate size, and of the curved form usual in spiders of this genus, though less remarkably so than in some others, and they are of a dark brown colour.

The *maxillæ, labium,* and *sternum* are similar in colour to the falces, and clothed thinly with coarse hoary hairs.

The *abdomen* is oval and projects a little over the base of the cephalothorax; the ground-colour is dull brownish-yellow clothed with hoary and other hairs; the longitudinal central black-brown marking on the fore part of the upperside is cruciform near its hinder extremity, where it is also strongly bifid, the limbs of the bifid portion being recurved; this bifid part represents, in fact, the foremost of the series of blackish-brown angular bars running along the middle of the hinder half; the sides are irregularly marked and blotched with dark brown; and the underside has a broad longitudinal central brown band throughout its length; and on either side of this band is a large oblong oval whitish patch, formed chiefly by hoary hairs. The transverse supernumerary mammillary organ is present, close in front of the ordinary spinners; but no calamistra are visible on the metatarsi of the hinder pair of legs.

DICTYNA CONDUCENS, sp. n. (Plate LVIII. fig. 3.)

Adult male, length 1 line.

This Spider is very nearly allied to the next, *D. condocta*, resembling it closely in colours and in the general character of its markings. It may, however, be easily distinguished by the less distinctness and boldness of the markings on the abdomen, as well as by the darker thorax contrasted against the paler caput, some of the hoary hairs on which last form a tolerably distinct narrow longitudinal band.

The *clypeus* also *exceeds in height* half that of the facial space, and projects more forwards. The underside of the abdomen also is of a uniform pale dull yellowish colour.

The radial joints of the palpi are destitute of the characteristic spine near the hinder extremity of the upperside; the digital joints are smaller in proportion; and the spine surrounding the palpal organs is far less strong and conspicuous, being shorter and much more slender.

The *falces*, while presenting the characteristic form of the genus, exhibit it in a less marked degree than those of *D. condocta*.

Adults of both sexes appeared to be numerous on the branches of the Sont Acacia, in February, March, and April, near Cairo and in other parts of Lower Egypt.

DICTYNA CONDOCTA, sp. n. (Plate LVIII. fig. 4.)

Adult male, length rather less than 1 line.

The *cephalothorax* of this small species is strongly constricted laterally at the junction of the caput and thorax; the caput is slightly elevated and rounded; the clypeus projects forwards at its lower part, and its height is not quite equal to half that of the facial space.

The colour of the cephalothorax is a deep yellow-brown with a blackish margin; and its surface is thinly furnished with coarse hoary hairs.

The *eyes* are in the usual position; those of the fore central pair are separated by a wider interval than that by which each is divided from the lateral eye on its side; those of the fore and hinder central pairs form very nearly a square, the posterior side being a little longer than the anterior one; those of the fore central pair are dark-coloured, the rest being of a light hue.

The *legs* are moderately strong, and rather long; their relative length being 1, 2, 4, 3; they are of a pale yellowish hue, and furnished with hairs.

The *palpi* are short, similar to the legs in colour, except the digital joint, which is of a yellow-brown hue; the cubital and radial joints are both very short; but the latter appears to be a little the longest, and has at the hinder extremity of the upperside a short, bent, pointed spine whose tip is of a dark blackish colour; the digital joint is large, and the palpal organs simple, though prominent at their hinder extremity; they are completely encircled by a strong black tapering spine, which is very visible close beneath the margins of the joint.

The *falces* are of the usual characteristic form, and similar in colour to the cephalothorax.

The *maxillæ, labium,* and *sternum* are rather paler in colour than the cephalothorax, but present nothing at variance with the generic type; the sternum is finely clothed with coarse hoary hairs.

The *abdomen* is oval and projects considerably over the base of the cephalothorax; it is of a yellowish brown colour, clothed with hoary, yellowish, and blackish hairs intermixed; it has a narrow ill-defined dark brown longitudinal central bar on the fore half of the upperside, cruciform at its hinder part, and followed by a series of angular lines or chevrons to the spinners; these lines terminate laterally in indistinct spots or blotches; and outside the two or three hindermost blotches are some ill-defined spots or patches of hoary hairs, of which there are some more in two tufts just above the spinners; the underside is of a dull brownish yellow hue, clothed with greyish hairs and with pale lateral margins.

An adult female, evidently of the same species, is considerably larger, and the abdomen covered with cretaceous white spots; the longitudinal central brown marking on the fore half of the upperside is broader, better-defined, and angular on its lateral margins, and the spots laterally terminating the succeeding angular bars are well defined, forming two longitudinal rows converging to the spinners: the underside has a broadish longitudinal brown band; and the spinners are surrounded by several short blackish radiating elongate spots or short bars. The usual supernumerary mamillary organ is present, together with calamistra on the metatarsi of the fourth pair of legs; the latter, however, do not exist in the males.

Two adult males and two females, one adult, the other immature, were beaten from the branches of the Sont Acacia in lower Egypt in February 1864.

Fam. Agelenides.

Gen. Titanœca, Thor.

Titanœca distincta.

Amaurobius distinctus, Cambr. P. Z. S. 1872, p. 263.

Titanœca albomaculata, Sim. Arachn. de France, i. p. 218, pl. iii. fig. 7.

Adults and immature examples of this Spider were found among the dead stems and débris of bushes and under stones near Alexandria in April 1864. In the same month of the year following I met with it more abundantly under stones and fragments of rock and among débris on the plains of the Jordan.

The synonymic reference above to M. Eugène Simon's 'Arachnides de France' is, I feel sure, correct; but there seems much reason to doubt the correctness of the reference quoted by that author from M. H. Lucas's 'Exploration en Algérie;' the *Epeira albomaculata*, Luc., seems to me by no means certainly of the same species, or even genus, as that described and figured *l. c.* by M. Simon.

Gen. AGELENA.

AGELENA LEPIDA, sp. n.

Adult male, length 3 lines; adult female, $3\frac{1}{2}$ lines.

The whole of the fore part of this Spider is yellow. The *cephalothorax* has its surface clothed with a grey pubescence; it is marked with somewhat irregular blackish-brown radiating lines following the direction of the normal grooves and indentations, and bounded laterally by another broken or interrupted line of the same colour a little way from, and parallel to, the lateral margins, giving the surface of the *cephalothorax* a somewhat boldly reticulate appearance.

The *eyes* are in the ordinary position, forming two strongly curved and nearly parallel lines, whose convexity is directed backwards. The interval between those of the hind central pair is a little greater than that between each and the lateral eye of the same row on its side; those of the fore central pair are the largest of the eight, they are separated by less than a diameter's interval, and each is very nearly contiguous to the lateral of the same row on its side. The four central eyes form a quadrangular figure whose longitudinal is rather greater than its transverse diameter.

The *legs* are long and tolerably strong, their relative length apparently 4, 1, 2, 3; the difference, however, between those of the second and third pairs is very slight. The femora are thickly and irregularly banded with blackish brown, they are furnished with hairs and long spines; and each tarsus ends with three slightly curved claws, of which the superior pair are pectinated, and the inferior one is much the smallest.

The *palpi* are short and strong; the radial and cubital joints are very short; the latter is the longest, and has a short, moderately strong, bifidly angular prominence at the extremity of its outer side; it has also two long strong curved tapering bristles directed forwards from its upperside, one from the fore, and the other from the hinder extremity; the radial joint is also somewhat protuberant in front towards the outer side, and is furnished with two pairs of bristles, of the same kind as those on the cubital joint; the digital joint is large equalling the falces in length, and its fore extremity is drawn out into a longish point. The palpal organs are well developed, surrounded on their outer margin with a strong shining corneous-looking yellow-brown fillet, and terminating anteriorly with a strong twisted corneous process of a similar colour.

The *falces* are rather long, strong, straight, prominent in front near their base, and directed rather backwards towards the labium.

The *maxillæ* and *labium* are of normal form, the latter being a little suffused with a dusky blackish hue.

The *sternum* has a strong irregularly edged blackish margin.

The *abdomen* is of a dull yellowish colour, with a broad longitudinal whitish band on its upperside; this band is mottled, and at the fore part strongly suffused with rusty red; its lateral edges are crenellated or bluntly denticulate, the prominent points being distinctly whiter and brighter than the rest, and forming two nearly parallel longitudinal rows of bold whitish spots along the whole length of the abdomen; most of these spots are in fact the enlarged extremities of the usual transverse angular bars or chevrons; and between each the space is black; there are also some black spots and markings on the sides, the underparts of the abdomen being unicolorous; the central longitudinal band has some black spots and markings on its fore part irregularly defining the normal elongate marking; the spinners are yellow, devoid of markings, and those of the superior pair are rather more than double the length of those of the inferior, the second (terminal) joint being smaller, though longer, than the basal one.

The female resembles the male in colour and markings; these are, however, less strong and distinct than in the latter sex, while the legs of the female have the tibiæ as well as the femora annulated with dusky blackish, and the underside of the abdomen has two longitudinal lateral lines of the same hue. The genital aperture presents two oval orifices side by side.

An adult male and several adult and immature females were found in tufts of coarse grass and dry herbage on the desert near Gebel y Silsilis, Upper Egypt, in March 1864.

Gen. TEGENARIA.

TEGENARIA PROXIMA.

Tegenaria proxima, Cambr. P. Z. S. 1873, p. 217.

An adult male of this Spider, which, though exceedingly closely allied to *T. derhamii* (Scop.), is yet quite distinct, was found in Cairo in January 1864.

Gen. TEXTRIX, Sund.

TEXTRIX COARCTATA.

Aranea coarctata, L. Duf., Sim. Arachn. de France, ii. p. 125.

Textrix moggridgii, Cambr. Journ. Linn. Soc. xi. p. 537, pl. xiv. fig. 6.

Adult and immature females of a Spider which I believe to be of this species were found among stones and débris at Alexandria in April 1864; the adult examples, however, are more brightly coloured than those I have received from Mentone; the cephalothorax and legs being of an orange-yellow brown colour; the fore part of the former (caput) and the falces are tinged strongly with red-brown, and the median line of the fore part on the upperside of the abdomen suffused with rusty red. These differences of colouring are probably dependent on the length of time that had elapsed since the Spider effected the final casting-off of its skin.

Gen. ENYO.

ENYO NITIDA.

Enyo nitida, Aud. in Sav. Egypte, p. 135, pl. iii. fig. 7.

Clotho nitida, Walck. Ins. Apt. i. 639.

An adult female of an *Enyo* which I believe to be of this species was found under a stone near Alexandria. It may, however, possibly be of a different species, though it agrees in most respects with the descriptions given (*ll.c.*). The chief difference I can detect is in the colour of the legs; but as this may differ considerably in examples of different ages or in different states of preservation, it is not always conclusive on a point of specific identity. In the example now recorded the legs are yellow, the greater part of the femora of the first pair as well as lower part of those of the other pairs being suffused strongly with brownish black; the cephalothorax is deep reddish brown, becoming black on the caput; the sternum and labium are yellowish strongly suffused with deep brown, the maxillæ and palpi being dull yellowish; and the abdomen is of a uniform purplish black above and on the sides, the underside being of a dull yellowish drab colour; the legs are furnished with short dark blackish brown hairs.

In the description given of *E. nitida* by Walckenaer the legs are said to be black, with a white ring at their base, and another of greater extent at the base of the femora of the third and fourth pairs.

ENYO EXPERS, sp. n.

Female, immature, length 1 line.

The whole of the fore part of this Spider is of a brightish yellow colour, the legs, palpi, and sternum being rather the palest.

The *cephalothorax* is of a somewhat oblong oval form with little or no lateral constriction at the caput; its convexity also is very moderate; the clypeus, which equals in height half that of the facial space, is very projecting.

The *eyes* are in the ordinary general position: the two large fore central ones are on a large roundish black patch; and the three lateral ones on either side are contiguous to each other and form a short curved row on either side, the foremost eye being very nearly contiguous to the large eye on its side; the interval between the fore central eyes is nearly an eye's diameter.

The *legs* are not very long; their relative proportion appears to be 4, 1, 2, 3; and they are furnished with hairs only.

Falces not very long, but strong, conical, and vertical.

Abdomen oblong-oval; of a dull yellow colour, the upper part dark rusty red, with several indistinct slightly angular pale bars or chevrons on the hinder half. The spinners (apparently four in number) are not easily discernible; but on either side of them is a patch of deep rusty brown.

A single example of this Spider (differing both in its general form and colour from all others known to me) was found under a stone at Alexandria in the month of April 1864.

Fam. HERSILIIDES.

Gen. HERSILIA, Sav.

HERSILIA CAUDATA? var. (aut nov. sp.). (Plate LVIII. fig. 6.)

Hersilia caudata, Sav. Egypte, p. 114, pl. i. fig. 8.

In respect to this Spider, the type of the genus, all authors subsequent to Savigny appear merely to have followed him in his figure and description. The locality given for *H. caudata* is "les environs du Caire." On the first morning of my arrival at Cairo, in January 1864, I found a species of *Hersilia* frequent on the trunks of the trees in the Esbekeyah, close in front of Zeck's hotel; all were females, in different stages of immaturity. Numerous searches there and in other parts round Cairo failed to produce more than this one species, which I met with again several times during the ascent of the Nile to Assouan. I did not find any other species (except one, of a now separated genus *Hersilidia*, under stones at Alexandria) during my stay in Egypt. I cannot, therefore, help thinking that, in spite of very manifest differences between my specimens and the figure and description of *Hersilia caudata* given by Walckenaer and Lucas (following Savigny), the species I now record is that upon which the latter author founded the genus.

The following description of the examples I met with may perhaps call the attention of araneologists to the differences noted; and possibly the true *H. caudata* may eventually prove to be a distinct species, in which case I would propose for that now described the name *Hersilia diversa*.

The length of the largest immature female captured is rather over 3½ lines. The colour of the cephalothorax is a deep blackish brown, rather the palest along the middle line, on the hinder slope, and a little above the lateral margins; the upper part of the caput is black, with a short brightish orange-yellow longitudinal streak on the hinder part between the eyes of the hind central pair. The clypeus (which equals in height two thirds of that of the facial space) is orange-yellow above and dull yellow on its lower part, the middle of which has a short longitudinal white streak with a blackish patch on each side of it. This arrangement of colours gives a very distinct and diversified appearance to the "facies," and appears to be pretty well defined in all the examples met with (*vide* fig. 6 *b*).

The *legs* are of a dull yellowish hue, marked and broadly annulated with yellow and blackish-brown; these markings form a broken longitudinal line of deepish black-brown on the fore sides of the femoral joints.

The *palpi* are similar to the legs in colour, and marked with black-brown on their upper or fore sides.

The *abdomen* is of a dull yellowish brown above, thickly punctuated with pale yellowish points mixed with a few blackish spots here and there, chiefly near the cephalothorax, the lateral margins of the upperside of the abdomen are very distinctly defined by the inner edge of the black markings on the sides; this well-defined edge is denticulate or strongly crenellated; along the middle line of the fore half is a strong and very distinct black longitudinal marking, denticulate or irregularly jagged on its edges; this marking is broadest near its middle, and comes to a blunt point about two thirds of the distance from the cephalothorax to the spinners, and is followed by some broken angular bars, or chevrons, which decrease in length towards the hinder extremity of the abdomen; in addition to the above markings, there are four pale transverse wavy lines, which cross the whole of the upperside of the abdomen, the two foremost, however, being interrupted by the longitudinal black marking; the sides of the abdomen are marked, but not regularly, with blackish brown spots and small markings, some of them assuming an oblique direction; but none of the lateral markings extend far down towards the underside, which is (as are also the sternum, maxillæ, and labium) of a plain yellowish hue devoid of markings. The long spinners of the superior pair are dull yellow faintly marked or annulated with yellowish brown, or sometimes with brownish black.

The description given by Walckenaer and Lucas from Savigny (I am unfortunately unable to give it from Savigny's work itself) is:—"Roux; le corselet marqué de deux bandes dorsales brunes, et bordé de taches de la même couleur. Abdomen varié sur le milieu de deux rangées contiguës de taches cannelées brunes, et sur les côtés, de traits bruns obliques."

The quickness of the movements of this spider, which, until disturbed, lies motionless, with its legs flat and extended in all directions over and round the trunks of the trees, is astonishing, and rendered its capture, at first, very difficult; after a little practice, however, I obtained it more easily by dexterously flicking it off the tree with a twig into an entomological net held underneath.

This was the first Spider that I had seen in Egypt; and it was thus invested with a peculiar interest, being also so unlike any thing European that I had before met with.

Neither sex appears as yet to have been found in the adult state; and in fact I saw, and captured, only females, and all those immature. Walckenaer does not state whether the example (also a female) described by Savigny was adult or immature.

It does not appear to have been before noted that the subdivision of the metatarsi (on which the separation of *Hersilia* from *Hersilidia* is chiefly based) only occurs in respect to the legs of the first, second, and fourth pairs, the short third pair having the usual number of joints, with an undivided metatarsus. It is singular that M. Lucas, who has gone so minutely into the structure of the legs of *Hersilia*, should not have noticed this point.

Gen. HERSILIDIA, Sim.

HERSILIDIA LUCASII, sp. n. (Plate LVIII. fig. 5.)

Adult male, length 2½ lines.

The whole of the fore part of this Spider, whose general form closely resembles other species of the genus, is of a pale yellow colour, the cephalothorax, palpi, and legs being covered with a fine grey pubescence; the *cephalothorax* has a dusky brown margin; and an indistinct line of the same hue runs backwards from each eye of the hind central pair, meeting and terminating at the normal indentation which marks the union of the caput and thorax; the hinder slope has also a central longitudinal brown line.

The *eyes* are in the usual position; the four central ones form a square whose fore side is a little longer than the hinder side, the two eyes forming the fore side being the largest of the eight, and separated from each other by an interval of rather more than an eye's diameter.

The *legs* are strong, but of more moderate length as compared with those of *Hersilia*, and the metatarsi are undivided; their relative length appears to be 4, 2, 1, 3, those of the first and second pairs are unicolorous, while the femora and, in some examples, the tibiæ of those of the third and fourth pairs are faintly annulated with dusky brown; they are furnished with hairs and a few short fine spines.

The *palpi* are strong and moderately long; the radial and cubital joints are short, about equal in length, and of a somewhat tumid or nodiform appearance; the humeral joint has a few black spines dispersed on its upperside, and there are a few bristles on the other joints; the digital joint is drawn out at the fore extremity into a longish point (like that of the genus *Tegenaria*) and terminates with two black, slightly curved claws, in this point resembling *Hersilidia simonii*, Cambr. (found in the Jordan valley and at Jerusalem). The palpal organs are of a somewhat flattened circular form, encircled with a dark corneous margin or closely fitting spine, and have two small erect corneous processes near together, about the middle of their fore part, one of these processes being shorter and more obtuse but stronger than the other.

The *falces*, *maxillæ*, and *labium* are of normal form; and the *sternum* has a broadish dusky-brown lateral margin.

The *abdomen* is of an oblong-oval form, a little broadest towards its hinder part, rather truncate before, and projecting a little over the base of the cephalothorax; it is of a straw-yellow colour, clothed with a fine grey pubescence; on the upperside a well-defined longitudinal black-brown marking occupies the middle line; this marking begins near the fore margin and extends halfway to the spinners, and is very strongly angulated on its edges, the middle part being the strongest, and taken by itself forming a large diamond-shaped patch; the sides are marked with three or four oblique lines of small elongated brown spots reaching quite to the underside, which is of a plain dull luteous colour; the spinners are short compared with those of *Hersilia*, but similar in position and character, and resembling the legs in colour.

The female (immature) resembles the male in colours and markings.

This species is nearly allied to *Hersilidia simonii*, Cambr.; but, besides being larger, it differs both from that species and from *H. oraniensis*, Luc., in being of a different hue and much less strongly marked, especially in the annulation of the legs; the pattern also on the abdomen differs notably from that of *H. simonii*; and there are on the abdomen none of the coarse hairs with which that of *H. simonii* is furnished. Two adult males and several immature examples of both sexes were found under stones in the desert between Alexandria and Ramleh. Their position is usually with the legs extended flat upon the underside of the stone, with the sandy-yellow mottled colour of which the colour of the Spider so admirably agrees that it requires a practised eye to detect it; and in fact its movement is generally the first cause of its detection. Its specific name is conferred in compliment to M. H. Lucas, of the Jardin des Plantes, Paris, to whom we are indebted for descriptions and figures of so many North-African Spiders.

Fam. SCYTODIDES.

Gen. LOXOSCELIS, Heinek. et Lowe.

LOXOSCELIS RUFESCENS.

Loxoscelis rufescens, Duf. An. Sc. Phys. t. v. p. 203, pl. 76.
Scytodes rufescens, Sav. Egypte, pl. v. fig. 2.

Adult and immature females of this Spider were found among the ruins of an old mud wall near Cairo, and an immature male in a similar situation at Alexandria.

Gen. SCYTODES.

SCYTODES THORACICA.

Scytodes thoracica, Walck. Ins. Apt. i. p. 271.

An immature female of a Spider which is probably only a variety of this species, was found in an old building at Cairo. The only apparent difference between this example and the typical *S. thoracica* consists in the very faintly marked cephalothorax, the abdomen marked only with two converging rows of black spots on the hinder half, and the legs wholly immaculate. The discovery, however, of adult examples may possibly prove it to be of a distinct though closely allied species; at present it would scarcely be justifiable to found a new species upon a single immature example.

Dr. L. Koch (Ægyptische und Abyssinische Arachniden, Nürnberg, 1875, p. 27, Taf. iii. fig. 2) describes and figures a new species from Cairo (*S. immaculata*); from this, however, the present Spider differs quite as much as from the typical *thoracica*, though possibly it may eventually prove to be a variety of Koch's Spider instead of *S. thoracica*.

SCYTODES KOCHII, sp. n.

Female, immature, rather over 1½ line in length.

Although the cephalothorax of this Spider is but little higher at its posterior than at its anterior extremity, it is, I believe, a true *Scytodes*. The clypeus is broad, truncate, and a little upturned at its lower edge, its height being about equal to the dimensions of one of the fore central pair of eyes; the colour of the cephalothorax is a rather bright orange-yellow, with a deep-brown band running backwards from each lateral pair of eyes nearly, if not quite, to the hinder margin; these bands are broadest about the middle, and each is marked with a slightly oblique longitudinal stripe of orange-yellow near the fore extremity; and between them is a deep-brown tapering line running a little way backwards from the central pair of eyes. The cephalothorax is also strongly margined with dark brown; and each of its sides is marked with three short, but distinct, oblique brown bars or stripes joining in at their lower extremity with the lateral brown margins. The surface of the cephalothorax is closely covered with erect bristly hairs.

The *eyes* are in three pairs, in the usual position; the two fore lateral eyes are the largest, and those of the central pair appear to be the smallest, though not much, if any thing, smaller than the hind laterals.

The *legs* are yellow; the tibiæ of the fourth pair are broadly and distinctly banded with brown; those of the third pair are faintly so banded, while those of the first and second pair are dark yellow-brown with a narrow indistinct band of yellow, the metatarsi also of the first pair being strongly suffused with yellow-brown.

The *palpi* are yellow, annulated with dull brown.

The *falces* yellow, with a considerable part of their foreside yellowish brown.

The *maxillæ*, *labium*, and *sternum* are yellow.

The *abdomen* is of a deep chocolate-brown above and yellow underneath; the central longitudinal line of the upperside is a little paler, and has two yellow spots on its fore part, and a yellow longitudinal line on its hinder part; the brown and yellow of the upper- and undersides run into each other in a Vandyke pattern, giving the sides a very distinct curvilinearly striped appearance. The abdomen, like the cephalothorax, is covered thinly with strong erect bristly hairs.

A single example of this pretty and very distinct species was found among débris near Cairo in January 1864; and I have very great pleasure in naming it after my kind friend Dr. Ludwig Koch, of Nürnberg.

Fam. PHOLCIDES.

Gen. PHOLCUS, Walck.

PHOLCUS SEMICAUDATUS, sp. n.

Adult male, length 2 lines.

The *cephalothorax* is of the ordinary form and of a pale straw-yellow colour.

The *eyes* are in the usual general position; three large eyes contiguous to each other in a triangle on a tubercle on either side, and a pair of much smaller size and nearly contiguous, just opposite the inner eyes of the other two groups; each eye of this pair is rather less than a diameter's distance from the two foremost eyes of the lateral group nearest to it.

The *legs* are very long, exceedingly slender, and furnished with fine hairs; their colour is similar to that of the cephalothorax, the genual joints are yellow-brown; and the femora and tibiæ, especially the former, are distinctly marked with small linear black dots and spots.

The *falces* are suffused with yellow-brown, strongly excavated in front, their fore margin on the outer side terminating in a corneous point, and of a red-brown colour.

The *palpi* are large, similar in colour to the legs, strong and tumid, especially the radial joint, which is of a somewhat globular form. The digital joint is considerably produced at its fore extremity (the produced portion being dark yellowish brown), and terminating with an irregular corneous process. The palpal organs are globular, with a strong corneous process issuing from them and directed backwards; this process is of a dark red-brown colour mixed with black, of a somewhat twisted form, and very obtuse at its extremity.

The *maxillæ* are of the usual form, pale yellow at their base and dark brown at their fore part, the extreme point being whitish.

The *labium* is also dark brown, but pale whitish at its apex.

The *sternum* is dark brown, marked obscurely with some still darker radiating lines.

The *abdomen* is of moderate length, very convex above, gradually and considerably elevated backwards and, in a slightly produced form, at its hinder extremity, giving it a subtriangular shape when looked at in profile; this elevation is much stronger in the female than in the male; it is of a dull luteous colour; the fore half of the upperside has an indistinct elongate central longitudinal marking, sometimes pretty distinctly defined by a fine blackish marginal line; this marking is broadest in the middle, where it has an angular point and short oblique line running from it backwards on each side, with a similar point and line on either side of its obtuse termination; following this are two or three duplex angular blackish bars, or chevrons, continued by some fine linear spots and markings towards the spinners; and on either side of the highest point of the abdomen are two or three blackish irregular spots. The different examples vary in the number, extent, and regularity of these markings; in some specimens most of them are obsolete or nearly so. A broad black and red-brown band occupies the central longitudinal line of the underside, but is usually interrupted a little way from the spinners.

The female resembles the male in colours and markings; but her abdomen, as above observed, is more strongly elevated behind, and its markings are generally better-defined; the genital aperture is a large transverse slit in a strongly but gradually elevated epigyne.

The form of the abdomen, which approaches but is not nearly so produced as that of *P. caudatus* (Duf.), will readily distinguish this species.

I met with it pretty frequently among the ruins of the ancient temples in various parts of Egypt above Cairo, but principally in those above Thebes. It is very nearly allied to, but appears to be quite distinct from, *Pholcus lyoni*, Bl., found in the Calcutta Presidency of India, and which I have myself also received from Bombay (sent to me by Major Julian Hobson) as well as from Calcutta, sent to me by C. Curtoys, Esq.

PHOLCUS RIVULATUS.

Pholcus rivulatus, Sav. Egypte, pl. iii. fig. 12.

? *Pholcus ruralis*, Blackw. Ann. & Mag. N. H. (3) vol. i. p. 432.

Adult and immature examples of both sexes of this Spider were found in old buildings and under large stones at Alexandria and Cairo. A strong specific character, not before recorded, so far as I am aware, of the adult male, is furnished by a single longitudinal closely set row of short but distinct and rather strong black spines, reaching from near the base on the underside of the femora nearly to the anterior extremity of the tibiæ of the first pair of legs.

This Spider, described by Mr. Blackwall (*Pholcus ruralis, l. c. suprà*), is probably of this species.

Fam. THERIDIIDES.

Gen. LATRODECTUS, Walck.

LATRODECTUS EREBUS.

Latrodectus erebus, Sav. Egypte, pl. iii. fig. 9.

Adult females, with their large globular brown egg-cocoons, were found under stones among the ruins of an old building at Alexandria.

Dr. Thorell (Europ. Spiders, p. 95) rejects the derivation of Walckenaer's generic name *Latrodectus* from *λάτρον*, wages or reward, and *δεκτός*, received, as yielding no rational meaning for the name, and thence derives it from *λάθρα*, secretly, and *δηκτής*, biting. Those, however, who have looked most closely into the derivations of names given to genera and species of animals know best how very little rational meaning there is in a large number of them, in cases where the derivation is almost, and sometimes absolutely, certain.

In a well-known instance a species of Lepidoptera was named by a British author "decimella," merely because he had pinned it with a number-*ten* pin. Another instance is furnished by Baron Walckenaer himself, who named a Spider "Carolinum" for (there is no doubt) the excellent reason (?) that it had been found by his little son Charles (*Carolus*). Rather than impute to the Baron the manifest impropriety of writing *Latrodectus*, if he had really derived it from *λάθρα*, I would suppose that he had some reason to look upon the discovery of the type of his genus as the happy result of some trouble or difficulty, and thus gave it the name (rightly written *Latrodectus*) from the Greek words given as its derivation by Agassiz (Nomencl. Zool.) and rejected by Dr. Thorell, *i. e. λάτρος* (a form of *λάτρον*), wages or reward, and *δεκτός*, one meaning of which is *acceptable*. If this be "no rational meaning for the word," it appears to be, at any rate, more probable than the derivation given by Dr. Thorell. The derivation given by M. Simon, Hist. des Araignées, p. 177 (also rejected as irrational by Dr. T.), from *λάτρευς*, a workman, and *δηκτής*, a biter, would not be improbable, since we find that Walckenaer (Aranéides de France, p. 81, where he confers the name) remarks especially on the manner in which the Spider spins its snares for the entrapping of its prey beneath the stones.

Gen. LITHYPHANTES, Thor.

LITHYPHANTES HAMATUS.

Phrurolithus hamatus, Koch, Die Arachn. v. p. 105, pl. 206. fig. 507–8.

Lathrodectus hamatus, Cambr. P. Z. S. 1872, p. 288.

Adult females were found under stones near Alexandria in April 1864. It is an exceedingly variable species in respect to its markings: two of those met with had an entirely black abdomen; and the rest varied considerably in the extent and colour of the normal pattern; most probably the *Phr. lunatus* and *Phr. erythrocephalus* (Koch), *l. c.* fig. 509, 510, as well as *Latrodectus venator*, Sav. Egypte, pl. 3. fig. 11, and *Latrodectus ornatus*, Luc., Explor. in Algér. p. 233, pl. 14. fig. 8, are varieties of this species.

The chief, if not the only, difference between *Latrodectus* and *Lithyphantes* consists in the wide separation of the eyes of the lateral pairs of the former, whereas in the latter they are contiguous or nearly so.

Gen. STEATODA (Sund.).

STEATODA SIGNATA, sp. n.

Length of an adult female, $1\frac{1}{2}$ line.

This Spider is of ordinary form and general characters; the cephalothorax, falces, maxillæ, labium, and sternum are of an orange-yellow colour tinged with brown; the *legs*, whose relative length appeared to be 1, 4, 2, 3, are rather short and slender; they are of a dull pale yellowish colour, furnished with hairs only, and the femora, especially of the first and second pairs, are strongly suffused with a dusky brown hue.

The *abdomen* is short, oval, very convex above, though rather flat on the upperside, abruptly rounded behind, and projects considerably over the base of the cephalothorax; it is glossy, and clothed thinly with fine pale hairs; its colour is a uniform kind of maroon or purplish red-brown, marked on the upperside with some elongate pointed oval pale dull yellowish markings, more or less covered with cretaceous white spots; three of these markings are situate on each side of the upper part, at equal intervals from the fore to the hinder extremity, the rest form a broken longitudinal central line on the hinder half. The four foremost of these markings form a large square whose fore side is a little shorter than the rest.

A single example of the female of this species, which at first sight very nearly resembles *Asagena serratipes* in the colour and markings of the abdomen, was found under a large stone at Alexandria.

STEATODA? MANDIBULARIS.

Theridion mandibulare, Luc. Explor. en Algérie, p. 260, pl. 17. fig. 1.

Pachygnatha? mandibularis, Cambr. Spid. Palest. and Syria, P. Z. S. 1872, p. 294.

Steatoda mandibulare, Sim. Bull. Soc. Ent. Fr. 1875, p. 222.

Epeira diversa, Bl. Ann. & Mag. N. H. Oct. 1859.

Adult males of this remarkable Spider were found running on the rails of the railway near Cairo, and females under stones near Alexandria.

In "Spiders of Palestine and Syria," *l. c. suprà*, doubts are expressed as to its generic place. It still appears to me that it can hardly be included in any hitherto characterized genus, though at present I hesitate to form a new genus for its reception. It is probably nearer to *Steatoda* than to any other; yet the very different form of the cephalothorax, in both sexes, appears to preclude it from that genus, to which, however, in deference to M. Eugène Simon's opinion, I now provisionally relegate it, in preference to *Pachygnatha*.

Gen. EURYOPIS, Menge.

EURYOPIS ACUMINATA.

Theridion acuminatum, Luc. Explor. en Algér. p. 268, pl. 17. fig. 10.

An adult female was found under a stone near Alexandria.

EURYOPIS SCRIPTA.

Theridion scriptum, Cambr. P. Z. S. 1872, p. 283.

Adult females were found under stones near Alexandria in April 1864.

EURYOPIS QUADRIMACULATA, sp. n.

This Spider resembles the two foregoing in respect of size, general form, and characters, but may be easily distinguished by a different distribution of colours on the abdomen. This part in the present Spider is of a deep brown-black colour marked with four elongate brownish yellow spots on the upperside, one at the fore and another at the hinder extremity, and another on each side, a little nearer to the fore than to the hinder spot; these lateral spots are the longest, and are placed obliquely, their inner extremities nearly meeting; the underside has a pale dull yellow transverse bar just behind the genital aperture, and another close in front of the spinners, the two being connected, or nearly so, by a longitudinal line of the same hue.

The *palpi* are short, the radial and cubital joints very short, but nearly equal in length; the digital joint is very large, and the palpal bulb well developed, a strong sinuous red-brown line (indicating, no doubt, the passage of an internal channel) may be seen on the outer side; and from the fore extremity there projects a strong, pointed dark red-brown corneous process, slightly curved and pointing backwards and a little outwards. An adult male and female were found near Alexandria under stones.

Gen. THERIDION, Walck.

THERIDION RUFOLINEATUM.

Theridion rufolineatum, Luc. Explor. en Algér. p. 260, pl. 16. fig. 10.

Theridion spirifer, Cambr. Zool. 1863, p. 8574, and P. Z. S. 1872, p. 280.

It appears, from a comparison of examples I have received from Algeria, pretty certain now that the Spiders referred to in the above synonyms are identical. Adult females were found on low plants near Alexandria in April 1864.

THERIDION VARIANS.

Theridion varians, Koch, Die Arachn. xii. p. 134, pl. 428. fig. 1056, 1057; Camb. P. Z. S. 1872, p. 280.

Adult females, of the same species as that found near Jericho in 1865, were found on low plants near Alexandria, and are, I think, quite correctly assigned to *T. varians*, Koch.

THERIDION SPINITARSIS, sp. n. (*Dipœna*, Thor. ?).

Adult female, rather more than 1½ line in length.

This Spider is of ordinary form, but of a stronger build than usual. The whole of the fore part is of a dull orange-yellow colour, the caput having a longitudinal central black stripe running from the eyes to the thoracic junction. The *legs*, whose relative length is 1, 2, 4, 3, are tolerably strong and moderately long; they are similar to the cephalothorax in colour, with the fore extremities of the tibiæ slightly marked with deep red-brown; they are more hairy than usual, the metatarsi being armed (particularly on their undersides) with long fine spines. The other joints also had, it is probable, originally been similarly furnished; but if so most of them had lost a great part of this armature by trituration.

The *abdomen* is oval, abruptly rounded, in profile, at its hinder extremity, and projects over the hinder slope of the cephalothorax; it is hairy, and of a yellow-brown colour thickly mottled with whitish-yellow cretaceous spots; the upperside has a broad longitudina pale yellowish white dentated band running down the centre from the fore margin to the spinners, getting slightly narrower as it leaves the middle of the abdomen and goes backwards; on either side of the hinder extremity of this band there are some ill-defined dark red-brown markings. The sides are Vandyked by some fine red-brown lines, one of which crosses over the upperside near the middle, and two others over the fore part; the underside is of a dull yellowish brown colour, with a large, somewhat quadrate, yellowish white transverse band across the middle.

A single example of this Spider was found on a low plant near Cairo. In the absence of the adult male I hesitate to include it in the genus *Dipœna*, Thor., to which it will very probably be eventually found to belong.

THERIDION MELANOSTICTUM, sp. n.

Adult female, length 1⅔ line.

This pretty species is nearly allied to *T. denticulatum*.

The *abdomen* is large and globular, and projects considerably over the base of the cephalothorax; it is of a yellowish colour, pretty thickly mottled above and on the sides with white cretaceous spots, and also marked with black spots and markings. In some examples the upperside is likewise tinged with reddish brown, giving a kind of tortoise-shell-marked appearance. The unequal distribution of the white spots faintly indicates a longitudinal central dentated band, which decreases in width as it approaches the spinners; and the black spots are chiefly arranged in a longitudinal line on each side of this band. The sides are marked with a strongish curved black bar towards the fore extremity, between which and the spinners are two or three oblique black markings, sometimes consisting of a mere spot or two, sometimes of a short continuous line. The underside has a large somewhat oblong transverse patch in the middle, which (lying between its ends) appears to continue the curved lateral bars.

The *cephalothorax* is of a somewhat orange-yellow colour, strongly margined with dusky black, and with a similarly coloured longitudinal central bar from the eyes to the indentation where the caput and thorax unite. The clypeus equals two thirds of the facial space in height; it is prominent and divided longitudinally by a blackish bar.

The four central *eyes* form as nearly as possible a square; and those of each lateral pair are contiguous to each other, and obliquely placed on a tubercle; the intervals between the eyes of the foremost row appear to be as nearly as possible equal, while the interval between the fore central pair is greater than that between each and the fore lateral eye next to it.

The *legs* are long and slender, their relative length 1, 2, 4, 3, those of the first pair being considerably the longest; they are yellow (sometimes dull orange), the fore extremities of the joints being more or less extensively marked with dark reddish brown; their armature consists of hairs and bristles only, the latter being rather conspicuous on the tibiæ and metatarsi.

The *maxillæ* and *labium* are of normal form and similar to the cephalothorax in colour; the former have a largish dusky black patch on the outer side; and in some examples all the labium except the apex is of a similar colour.

The *falces* are not very long nor strong; they are similar to the cephalothorax in colour, and marked longitudinally with blackish along their inner sides in front.

The *sternum* is of a glossy blackish brown colour.

Several females, adult and immature, were found on low plants near Alexandria.

Gen. MIMETUS, Hentz (*Ctenophora*, Bl.).

MIMETUS MONTICOLUS.

Ctenophora monticola, Bl. Ann. & Mag. N. H. June 1870; Cambr. P. Z. S. 1872, p. 287.

A single female of this Spider was found on a prickly-pear plant near Cairo in January 1864, and is identical with those found in a similar situation at Beirût in the following year.

Gen. ERIGONE, Sav.

ERIGONE SPINOSA.

Erigone spinosa, Cambr. Spid. Palest. & Syr. P. Z. S. 1872, p. 292, pl. xiii. fig. 12.

Adult males of this very distinct species were found running on the metals and permanent way of the railroad near Cairo and Alexandria.

ERIGONE ALEXANDRINA.

Erigone alexandrina, Cambr. P. Z. S. 1872, p. 755, pl. lxv. fig. 11.

Both sexes of this minute Spider were found on rushes and other plants growing in a marsh near Alexandria.

Gen. LINYPHIA, Latr.

LINYPHIA EXTRICATA, sp. n. (Plate LIX. fig. 7.)

Adult male, length $1\frac{1}{3}$ line.

This Spider, which is allied to *L. nigrina,* Westr., resembles it in form, general appearance, and colours.

The *cephalothorax* is of a dusky yellow-brown colour, with indistinct radiating brown lines following the normal grooves and indentations. The height of the clypeus rather exceeds half that of the facial space; and the profile line of the cephalothorax (including the hinder slope) forms a slightly curved line.

The *eyes* are very nearly equal in size and in two equally curved lines, the curves directed away from each other, thus forming a transverse oval figure; those of the hinder row are equidistant from each other, those of the fore central pair (which seem to be larger than the hind centrals) being near together but not contiguous to each other, the interval dividing them being a little less than that which separates each from the fore lateral eye on its side. The line formed by the fore centrals is a little shorter than that formed by the hind centrals; and each of the former is separated by an interval of its own diameter from the latter nearest to it; those of each lateral pair are seated, slightly obliquely and contiguously to each other, on a tubercle.

The *legs* are long, slender, their relative length 1, 2, 4, 3, of a pale yellowish hue tinged with brown, furnished sparingly with hairs and a few short fine spines.

The *palpi* are moderately long, slender, and of a similar colour to the legs; the cubital joint is short; the radial equally short, but produced at its fore extremity on the upperside, the termination being rather broader than the joint and evenly rounded; the digital joint is large, with a slight (and from some points of view angular) prominence at its base on the inner side, and a large prominent lobe on its outer side about the middle. The palpal organs are highly developed and complex: among the corneous processes of which they are made up, the normal curved one at their base is of large size and peculiarly characteristic form; sometimes it lies in close proximity to the rest of these organs; but generally it sticks out in a very noticeable way.

The *falces* are long and strong, divergent, and rather excavated on their inner sides near their extremities, where they are armed with several strongish teeth; they, as well as the *maxillæ, labium,* and *sternum,* are of a similar colour to the cephalothorax.

The *abdomen* is of a longish oval form, and projects a little over the base of the cephalothorax; it is of a brownish black colour, with a large pale patch just above the spinners, but not touching them.

The female resembles the male in colours; but the abdomen is larger and more globular, and the genital aperture is furnished with a strong curved epigyne which is directed prominently backwards; the relative length of the legs also differs in the female, those of the fourth pair being distinctly longer than those of the second pair.

Adults of both sexes were found on plants and shrubs both at Cairo and Alexandria.

Gen. PACHYGNATHA, Sund.

PACHYGNATHA ARGYROSTILBA, sp. n. (Plate LIX. fig. 8.)

Adult male, length 1 line.

The *cephalothorax* looked at in profile has a uniformly sloping and very slightly curved outline from the hind margin to the eyes; the area of the four central eyes is rather prominent. The clypeus, compressed close beneath the eyes, but rather prominent at its lower margin, equals in height half the facial space; it is of an orange-yellow-brown colour, with three longitudinal (but not very definitely outlined) dark yellow-brown bands; the lateral bands unite in front on the lower part of the clypeus.

The *eyes* are seated on tubercles, and do not differ greatly in size; the four central ones are the largest, and of very nearly uniform size, forming a square whose fore side is a little the shortest; the intervals between these eyes are scarcely a diameter; the eyes of each lateral pair are contiguous to each other on a single tubercle, the foremost being, if there be any difference, the smallest of the eight; the interval between each of these and that one of the four central eyes nearest to it in the same row appears slightly to exceed the interval between those of the central pair in that row.

The *legs* are long and slender, their relative length being 1, 2, 4, 3; they are of a dull yellowish colour slightly suffused with brown at the fore extremities of the tibiæ and metatarsi, and well furnished with rather conspicuous hairs.

The *palpi* are slender, and similar to the legs in colour. The cubital joint is short, nodiform at its base on the upperside, and constricted near its fore extremity; the radial joint is about equal in length to the cubital, but is much stronger, especially towards its fore extremity.

The digital joint is large, and of the same peculiar form as in others of the genus, the smaller division being of a somewhat S-shape; the palpal organs are very simple, consisting of a comparatively enormous and perfectly globular semidiaphanous dull orange-yellow bulb, with a small twisted process at its anterior extremity.

The *falces* are long, strong, divergent, and excavated towards their fore extremities on the inner sides, where they are also armed with two sharp strongish teeth; their colour is similar to that of the cephalothorax.

The *maxillæ, labium,* and *sternum* are of normal character, and of a dark yellow-brown colour.

The *abdomen* is of a short oval form, considerably convex above, but not nearly globular, and projects well over the base of the cephalothorax; it is of a dark yellowish brown colour mixed with blackish patches and markings above, and sprinkled thickly, both above and on the sides, with resplendent silvery markings and spots. These are generally gathered into a large, but not very long, longitudinal band or patch on each side of the fore half, the rest being more or less irregularly scattered, though in some examples they may be traced somewhat more regularly in transverse lines.

The female is rather larger than the male, and her abdomen is much more nearly globular in form; but in respect of colours and markings, the sexes are, as nearly as possible, similar to each other.

Two adults of each sex were found on rushes and other plants in a marsh near Alexandria.

Although much smaller than any yet known species of this genus, it surpasses all of them in beauty; the silvery spangled abdomen and enormous palpal bulb will serve to distinguish it at a glance.

Fam. EPEÏRIDES.

Gen. TETRAGNATHA, Latr.

TETRAGNATHA MOLESTA.

Tetragnatha molesta, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 295.

Three adult males of this Spider were found among rushes in a marsh near Alexandria.

TETRAGNATHA NITENS.

Eugnatha nitens, Sav. et Aud. Egypte, p. 118, pl. ii. fig. 2.

An adult female, of what I believe to be this species, was found on rushes in a marsh near Alexandria.

The fangs of the falces are very remarkable, being strongly and rather abruptly bent not far from the middle, with a strong conical protuberance, or tooth, on the hinder side between the bend and the articulation with the falx.

TETRAGNATHA FLAVA.

Uloborus flavus, Sav. et Aud. Egypte, p. 117, pl. ii. fig. 1.

An immature example of this Spider was found in the same situation near Alexandria as the last two species. The position of the eyes misled Audouin as to its generic affinity, which is undoubtedly with *Tetragnatha.*

TETRAGNATHA FILIFORMIS.

Eugnatha filiformis, Sav. et Aud. Egypte, p. 120, pl. ii. fig. 4.

An immature male and two adult females of this species were found in the same situation as the last, near Alexandria. The great prolongation of the posterior extremity of the abdomen (increasing its length by two thirds) makes the determination of this Spider easy.

TETRAGNATHA PELUSIA.

Tetragnatha pelusia, Sav. et Aud. Egypte, p. 119, pl. ii. fig. 3.

An immature female, of what I believe to be this species, was found near Cairo.

Gen. SINGA, C. Koch.

SINGA AFFINIS, sp. n.

This Spider is similar in size, form, and structure to *S. albovittata*, Westr. (*Epeïra calva*, Bl.); but an apparently constant difference in the abdominal pattern, and in some other points, convinces me that it is of a distinct though very nearly allied species. The upperside of the abdomen in *S. albovittata*, has three broad longitudinal denticulate bands, the central one of a cream-white colour, and that on each side reddish yellow-brown; these latter unite at their posterior extremities, and thus form a transverse band at that part; these three bands are immaculate; the central one distinctly terminates well inside of the transverse portion of the lateral bands, represented on this portion, at most, by a small yellowish spot. In *S. affinis*, however, these bands are not so vividly traced, and the lateral ones are of a dull blackish-brown hue, broken in upon and mottled with pale yellowish white, and they are connected at their posterior extremities by a very narrow bar, or simple line, the central band thus running to the same length as the lateral ones; moreover the central band is divided longitudinally from end to end by a distinct tapering stripe of reddish brown (or other colour similar to that of the lateral bands) giving off lateral lines at intervals, which appear again to divide the central band in a transverse direction. The legs and palpi differ also from those of *S. albovittata* by being yellow, distinctly crenellated with brown; the falces also have a brown patch at each end, the legs and palpi of that species, as well as the falces, being of an immaculate orange-yellow. Another difference is observable in the four central eyes; these in the present Spider form an exact square, while in *S. albovittata* the form is of a quadrangle rather longer than broad.

Two females were found on low plants near Alexandria.

SINGA LUCINA.

Epeïra lucina, Sav. et Aud. Egypte, p. 345, pl. iii. fig. 4; Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 299.

Adult females of this Spider were found among rushes and plants in a marsh near Alexandria.

Mons. Eugène Simon (Arachn. de France, tom. ii. p. 123) states in a note that the *Epeïra lucina* of Savigny is no other than the *Singa hamata*, C. Koch (*Epeïra tubulosa*, Blackw., &c.). I think, however, that this is not so. In the figure given by Savigny a very constant specific character is delineated in the pale markings on the two dark longitudinal bands on the abdomen: in *S. hamata* these are represented by markings which always completely divide the dark bands in a transverse direction, while in *S. lucina* these markings are always confined within the band as shown in Savigny's figure, and as observed constantly in the examples found in Egypt, and also in many more found in Palestine. I do not at all doubt the occurrence in Egypt of *S. hamata*, C. K., though I did not myself meet with it either there or in Palestine; but, for the above reasons, independently of its larger size, I feel sure that it is not the same as *E. lucina*, Sav.

Gen. ARGIOPE, Sav.

ARGIOPE AURELIA.

Argiope aurelia, Sav. Egypte, pl. ii. fig. 5.

Adult females of this fine Spider were found, not unfrequently, in the gardens and orange-groves at Shoubra and other places near Cairo, sitting in the midst of their large orbicular snares.

ARGIOPE STICTICALIS, sp. n.

It is with some hesitation that I give here as a new species some immature Spiders swept up among low herbage near Alexandria. It is possible that they are but the immature form of *A. aurelia*. In these young examples the abdomen is of a less flattened form than in that species, and is destitute of the transverse banding so distinct in the adult (and nearly adult) forms of *A. aurelia*, the uniform covering of minute cretaceous white points being only broken by a dull longitudinal branching line and here and there a blackish marking. The legs also, instead of being, as in *A. aurelia*, very distinctly annulated with black, are simply black-speckled, chiefly on the femora, and especially on those of the first pair.

Gen. CYRTOPHORA, Sim.

CYRTOPHORA OPUNTIÆ.

Cyrtophora opuntiæ, Duf. An. Sc. Phys. tom. iv. pl. 69. fig. 3.

This Spider is abundant on the prickly pear, sont acacia, young date-palms, and other low trees and shrubs, near and above Cairo.

Gen. EPEÏRA, Walck.

EPEÏRA CHLORIS.

Epeïra chloris, Sav. et Aud. Egypte, pl. iii. fig. 5.

Adults of both sexes were found not unfrequently on low plants in Upper Egypt*.

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* The Spider described as an *Argiope* (*Argiope epeïroides*) in Spid. Palest. & Syr., P. Z. S. 1872, p. 301, but which is certainly not an *Argiope*, is very nearly allied to *Epeïra chloris*, Savigny; it is, however, larger, of an even more elongated form, and differs in the pattern on the abdomen, as well as in the structure of the palpal organs.

Epeïra suspicax, sp. n.

Epeïra apoclisa, Sav. et Aud. Egypte, pl. iii. figs. 1, 2.

Having carefully compared adults of both sexes of this Spider, found on rushes in a marsh near Alexandria, with the European form of *E. apoclisa* (*E. cornuta*, Clk.), I am convinced that it is of a distinct species. It is much larger than any examples I have ever seen of *E. cornuta*, the length of the adult male being $4\frac{1}{2}$ and 5 lines, and of the female nearly 7 lines; there are differences also, though slight, in the structure of the palpal organs of the adult male.

Inasmuch as the name *apoclisa* (Walck.) is now only a synonym of the older name *cornuta*, Clerck, it might have been well to distinguish the present Spider as *E. apoclisa*, Sav. et Aud.; but as, until lately, this specific name has been so long the one current for the European *apoclisa* (*E. cornuta*, Clk.), it will probably best avoid confusion to rename it as I have here done.

Epeïra perplicata.

Epeïra perplicata, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 300.

Adults and immature examples of both sexes were found near Alexandria.

Epeïra circe.

Epeïra circe, Sav. et Aud. Egypte, pl. ii. fig. 9.

Immature examples, of both sexes, of what I believe to be this species were found at Alexandria.

Epeïra dromedaria.

Epeïra dromedaria, Walck. Ins. Apt. ii. p. 126.

Examples of this Spider were found both near Alexandria and Cairo.

Epeïra atomaria, sp. n. (Plate LIX. fig. 9.)

Adult male, length $2\frac{3}{4}$ to $1\frac{3}{4}$ lines; adult female, rather over 3 lines.

This Spider is nearly allied to *E. chloris*, Sav., particularly in the position of the eyes; but it may easily be distinguished by a decided difference of markings, as well as by its less-elongated form.

The *cephalothorax* is of ordinary form; its colour is yellow, clothed with rather coarse yellowish hairs, particularly on the caput; the oblique indentations, showing the junction of the caput and first thoracic segment, are broadly and distinctly marked with reddish brown.

The *eyes* are in the usual four pairs, rather small, and not very different in size; those of the hind central pair are near together (divided by about an eye's diameter), while those of the fore central pair are rather the largest of the eight and divided by a little more than two diameters, this interval being equal to that between each of them and the hind central eye on its side; the interval between each fore central and the fore lateral on its side is less than that between the fore centrals, while that between each hind central and the hind lateral on its side is very much greater than that between the hind centrals, being equal to about (or nearly) double the length of the line formed by these latter; those of each lateral pair are seated obliquely, but not quite contiguously, on a tubercle.

The *legs* are moderately long and not very strong; they are like the cephalothorax in colour, the femora being spotted with black, principally on their outer sides, the other joints are also marked and irregularly banded with black; they are furnished with hairs and spines; those of the second pair are distinctly longer than those of the fourth. In some examples the legs were more or less completely wanting in the black markings and spots.

The *palpi* are short and similar in colour to the legs; the radial and cubital joints are very short, the latter is prominent and somewhat angular on its upperside, where it is furnished with two long, strong, curved, tapering bristles; the digital joint is large, and of an elongate-oval form; the palpal organs are highly developed and complex, one of the corneous processes near their centre having two prominent, curved, horn-like spines.

The *falces* are moderate in length, but not particularly powerful; and their colour is yellow, with a large blackish patch near their base in front.

The *maxillæ* and *labium* are of normal form; and their colour is blackish, broadly tipped with pale yellow.

The *sternum* is oval, pointed behind; and its colour is blackish, marked with a broad, yellow, T-shaped marking on its fore part, followed near the middle by a somewhat diamond-shaped patch of the same colour.

The *abdomen* is of rather large size, and of a regular oval form, and projects considerably over the base of the cephalothorax; it is thinly clothed with hairs and bristles; some of the latter are long, of a pale yellowish colour, and of a spine-like character. Its colour is a straw-yellow, marked and spotted with black; the upperside presents a prettily freckled appearance, being thickly speckled with small black spots of different sizes, around the principal ones of which there is a slight clear space giving the appearance of an ocellated surface. Along the central longitudinal line of the upperside there is, usually visible, an indistinctly paler band, edged with a slightly dentated blackish line and narrowing as it approaches the spinners; this band is crossed towards its fore extremity by a distinct but irregular black linear marking reaching on each side to a longitudinal dentated black line; the dentations of these lines are bold, but bluntish; the underside of the abdomen is also spotted; there are likewise some other blackish markings, and some indistinct pale patches. In some individuals there is an indistinct pale transverse bar crossing the central one just behind the irregular black line mentioned above; these examples were of a generally sandy hue, the darker markings being reddish-brown instead of black, and the legs scarcely marked at all.

An adult female resembled these last in the general colouring; but her legs were entirely without darker markings; the abdomen also is less spotted, and the lines and bands noticed on the male (except the irregular transverse one on the fore part) are scarcely traceable; the sides are marked with oblique converging red-brown lines forming a vandyke pattern; and the underside is unicolorous.

Four males (three adult and one immature), and one adult female, were found on low bushes near Cairo and in Upper Egypt, and appear to me to be new to science.

Fam. ULOBORIDES.

Gen. ULOBORUS (Walck.).

ULOBORUS SIGNATUS, sp. n.

Adult male, length $1\frac{1}{2}$ line.

The *cephalothorax* of this Spider is of a short or round oval form, the site of the fore central pair of eyes being rather prominent; it is uniformly though not very convex above, but, on the contrary, rather depressed and the hinder extremity truncated and higher than the fore extremity; its colour is dark brown, with an indistinct and abbreviated yellowish bar on either side, leaving a broad central brown band and a marginal band on each side of the same colour; these, however, all merge into one at the caput where the yellow bars cease. Clypeus none.

The *eyes* are in two curved rows wide apart from each other; and the curves of both are directed forwards; the eyes of the hinder row are equal in size, and as nearly as possible equidistant from each other; those of the fore central pair are rather larger than those of the hinder row, and separated by about the same interval as those of that row from each other, each fore lateral being also nearly the same distance from the fore central eye on its side; the fore laterals are the smallest of the eight, and each is separated from the hind lateral on its side by a larger interval than that which separates the fore and hind central eyes.

The *legs* are very unequal in length and strength; their relative length is 1, 2, 4, 3, those of the first pair being considerably the longest and strongest; those of the first two pairs are of a dark yellowish-brown colour, the femora being the darkest, and marked obliquely near the middle on the upperside with a yellowish stripe; those of the third and fourth pairs are of a yellowish colour broadly annulated with brown: the tibiæ of the first pair had the stumps, apparently, of spines; but all the armature, of whatever nature, had been broken and rubbed off.

The *palpi* are short, of a yellowish colour, marked obscurely with brown; the cubital and radial joints are very short, the latter being somewhat gibbous or pointedly prominent on its upperside at the fore extremity; the digital joint is rather large, and the palpal organs prominent but simple in structure, with, apparently, a fine red-brown spine coiled round them near the middle; this spine may perhaps be only the corneous margin of the posterior lobe of the palpal bulb.

The *falces* are small and of a yellowish colour; the *maxillæ* straight, short, broad, and rounded at the outer extremity; the *labium* is small and pointed at the apex; these parts are blackish brown, edged and tipped with pale whitish yellow; and the *sternum* is dark-yellow-brown and of an oval form.

The *abdomen* is oblong-oval in form, somewhat gibbous above from the middle forwards; its colour is black or nearly so; the fore half has a narrow white yellowish marginal stripe on the upperside; and on the hinder half are four small, but distinct, elongate yellowish-white oblique spots forming a square; another spot of a similar colour is placed just above the spinners; the underside has two longitudinal yellowish bands running nearly throughout its whole length. The spinners are compactly grouped, those of the inferior pair being longer and stronger than the superior ones, which are two-jointed; immediately in front of the inferior pair is the transverse surface of the inframamillary organs; but there are no calamistra on the legs, the latter being seldom (never in my own experience) found in the male sex.

A single example of this very distinct *Uloborus* was found on a low plant on the way up the Nile between Cairo and Sioût.

Fam. THOMISIDES.

Gen. THOMISUS, Walck. *ad partem.*

THOMISUS LATERALIS.

Thomisus lateralis, C. Koch, Die Arachn. iv. p. 43, pl. 120. fig. 277.

Adults of both sexes were found among rushes and other water-plants in a marsh near Alexandria.

THOMISUS SPINIFER.

Thomisus spinifer, Cambr. Spid. Palest. & Syria, P. Z. S. 1872, p. 308, pl. xiv. fig. 14.

Both sexes adult, and immature females, were found not unfrequently on low-growing plants and flowers, as well as on the boughs of the sont acacia between Cairo and Thebes.

Gen. DIÆA, Thor.

DIÆA DIANA.

Thomisus diana, Sav. et Aud. Egypte, p. 161, pl. vii. fig. 9.

An adult male, with females adult and immature, were found on the branches of the sont acacia at various places between Cairo and Thebes.

DIÆA CANDICANS, sp. n.

Adult male, length $1\frac{2}{3}$ line.

The cephalothorax, falces, maxillæ, labium, and sternum are of a pale dusky whitish yellow colour, the legs and palpi being still paler, and the abdomen creamy white.

The general form is rather less robust than that of *D. diana*, and the legs proportionally rather longer and more slender.

The *eyes* of the foremost row are *very nearly* equidistant from each other; while those of the hind central pair are perceptibly nearer to each other than each is to the hind lateral on its side; the interval between those of each lateral pair is greater than that between the fore and hind central pairs, owing to the rather greater length and stronger curve of the hinder row; the fore lateral eyes are largest of the eight; the height of the clypeus is less than half of that of the facial space.

The *legs* are furnished sparingly with hairs and spines—their relative length being 2, 1, 4, 3, the difference between 2 and 1 and 4 and 3 respectively being very slight.

The *palpi* are similar in colour to the legs and rather short; the radial joint is shorter than the cubital, and has its outer extremity very slightly produced and terminating with a very small, blunt, curved, brown, claw-like process; the digital joint is narrow, and about equal in length to the radial and cubital joints together; the palpal organs are not highly developed nor complex, but apparently consist of a single flattish oval pale yellowish lobe, upon the hinder part of which there rests a strongish, pale, curved spine springing from the outer side of the base of the lobe, and tapering to a sharp point on the inner side.

The *abdomen* is of a regular oval form, and projects pretty well over the base of the cephalothorax; its upper surface is flattish, of a nearly white cretaceous appearance, marked longitudinally from near the fore extremity by a narrow central bar, defined merely by a dull marginal line, and, tapering at each end, fining off to a single line a little way from the spinners; the five normal impressed spots are visible on the upperside, one at the fore extremity of the central bar, and four forming nearly a square figure behind it, the anterior side of the figure being rather shorter than the rest; the underside of the abdomen is unicolorous.

An adult female differed only in the legs of the first and second pairs being shorter than those of the male.

The above examples were found on low plants near Alexandria.

Gen. XYSTICUS, C. Koch.

XYSTICUS HIRTUS.

Thomisus hirtus, Sav. et Aud. Egypte, p. 164, pl. vi. fig. 11.

An adult female of this Spider was found near Cairo.

XYSTICUS PROMISCUUS, sp. n.

Adult male, length $1\frac{2}{3}$ line.

This small *Xysticus* is nearly allied to *X. audax*, Koch; its general form, however, is shorter and broader, the cephalothorax being nearly circular save for the usual broad truncate form of the fore extremity of the caput; and the abdomen (which projects well over the base of the cephalothorax) is of a very short, broad, oval shape, obtusely pointed behind and slightly truncate before. The sides of the cephalothorax are thickly mottled with pale red-brown and yellow; the usual broad central longitudinal pale band, charged on its fore part with the normal spade-shaped marking, is yellowish red-brown, mottled finely with yellowish and fairly defined, at least at its hinder part, which is prolonged in a dark red-brown line down the hinder slope.

The *legs* are normal in respect of length and strength; they are marbled and streaked more or less coarsely with white, yellowish, and red-brown spots and blotches, and armed with spines, those on the tibiæ and metatarsi of the first and second pairs being rather long and strong; the metatarsi and tarsi are pale yellow, striped longitudinally with white.

The *palpi* are short and strong, of a pale yellow-brown colour, mottled faintly with whitish and darker brown: the radial joint is shorter than the cubital, and has its outer fore extremity produced into a short, tapering, bluntish-pointed apophysis, and a much larger one on its underside; this latter is broad and truncated at its extremity, which is broader than its base; the other (towards the inner side) is pointed: the digital joint is of a short oval form, with the usual apophysis issuing from near its base on the outer side. The palpal organs are very similar to those of *X. audax*, but may be easily distinguished by the form of the ┳-shaped spine: this in the present species is of a generally slenderer form, and has its shaft strongly bent, whereas in *X. audax* it is nearly or quite straight; the inner one of the cross bars also is longer in proportion to the other than in that species. The large pointed corneous process which issues from the inner side of the base of the palpal organs is also destitute of the thorn-like spine near the base of its lower edge, which is very conspicuous in *X. audax* and also in *X. cristatus*; in some respects this Spider appears to be more nearly like the latter in the palpal organs than the former; but whereas in *X. cristatus* the surrounding spine has its fine point always (so far as I have seen) straight, this in the present Spider is curved.

The *falces* are short, strong, subconical, and of a yellowish white colour, marked with red-brown, principally at the base and extremities.

The *sternum* is yellow-white, thickly speckled with pale purplish red-brown spots; and two oblique lines of the same colour are faintly visible on each side, with a similar short central line from the hinder extremity.

The *abdomen* is thinly clothed with erect bristles, and has its upperside of a pale chocolate red-brown colour, marked with a few black spots, chiefly near the margins, which are whitish and rugulose; the usual broad dentated band along the centre is visible and of a whitish colour, but greatly obscured by minute chocolate red-brown spots, the extreme points of the denticulations being the least obscured; about the middle of the denticulated band is a small, narrow, yellow stripe, pointed at each end, and its edges dark red-brown; the sides are rugulose, pale chocolate-brown, spotted with whitish and dark red-brown; the underside also is chocolate-brown, mottled finely with a deeper hue; the spinners are surrounded by a broken white line.

A female (which I feel no doubt is of this species) was of a generally paler and more ashy hue, but otherwise resembled it in form and markings.

Although so exceedingly closely allied to *X. cristatus* and *X. audax*, I have no doubt that the present is a perfectly distinct species, and that collectors will have but little difficulty in distinguishing it by its general appearance, apart from the special differences of the structure of the male palpi.

The examples above described were found on low plants near Alexandria.

XYSTICUS FERUS, sp. n.

Adult female, length $3\frac{1}{3}$ lines.

This fine but plainly-coloured Spider is allied to *X. bifasciatus*, C. Koch; its general form and structure are of the normal type. The *cephalothorax* is of an orange-yellow-brown colour veined and marked with red-brown, especially on the hinder slope; the ocular region and the middle of the clypeus whitish yellow; the normal spade-shaped marking, behind the eyes, is scarcely defined by an obscure yellow marginal line, its hinder extremity, however, being more apparent and of a whitish-yellow colour; from between the two hind central eyes to the beginning of the hinder slope, two parallel red-brown lines, close together, divide the caput longitudinally; the surface of the cephalothorax is thinly furnished with bristly hairs.

The *eyes* are in the ordinary position, and unequal in size, the fore laterals considerably the largest; those of the hind central pair are slightly larger, and nearer together than those of the fore central pair, the latter being further from each other than each is from the fore lateral on its side; while the eyes of the hind central pair are much nearer to each other than each is to the hind lateral on its side; the height of the clypeus is less than half that of the facial space.

The *legs* are not very long, but strong; they are yellow, marbled underneath, particularly the femora of the first and second pairs, with white, and furnished with hairs, bristles, and spines, the latter disposed in the usual way.

The *falces* are rather short, strong, but conical, similar in colour to the cephalothorax, with the anterior portion washed with yellowish white, and the front surface armed with strong black bristles.

The *palpi* are similar to the legs in colour, and furnished with bristles and spines.

The *maxillæ* and *labium* are of normal form, and, with the *sternum*, similar to the legs in colour; the *sternum*, however, is obscurely marbled with yellowish white.

The *abdomen* is oval, blunt, pointed behind and roundly truncated before, where it projects fairly over the base of the cephalothorax; it is of a generally dull sandy yellow-brown colour, and its upper surface furnished with short, strong, curved, black bristles; the sides and upper margins are very rugulose, the upper edges of the rugulosities more or less marked with whitish. The normal dentated, broad, longitudinal pale band on the upperside is scarcely visible; and the underside is rather paler than the rest.

A single example of this Spider, which I believe to be of an undescribed species, was found on a low plant near Alexandria.

XYSTICUS PECCANS, sp. n.

Immature female, length $1\frac{1}{4}$ line.

Although apparently far from maturity, I am induced to describe as a new species several examples found on plants in Egypt, believing that the specific indications afforded by their colours and markings will eventually be corroborated by the structural characters of the adult spiders.

The form of the *cephalothorax* is ordinary; and its colour is dull yellowish brown, darker on the sides than along the middle, and the ocular area dull greyish white, the lateral margins being very distinctly and regularly white.

The *eyes* are normal, but the fore laterals are proportionately larger than usual.

The *legs* are moderately long and tolerably strong, their relative lengths being normal; those of the first and second pairs (except the tarsi, which are pale yellowish) are of a dark brown with a chocolate tinge, most uniform on the tibial, metatarsal, and femoral joints; those of the third and fourth pairs are a uniform pale yellowish, which is also the colour of the palpi, maxillæ, labium, sternum, and abdomen. The latter is of a roundish oval form, and (in all the examples found) entirely destitute of markings; probably, however, this will not be found to be so in the adult examples, in which we may expect to find, though perhaps not very definitely, the normal pattern delineated.

The *falces* are short, strong, and subconical, of a yellowish colour, with a broad, distinct, transverse white band near the middle of their fore side.

XYSTICUS SUBCLAVATUS, sp. n.

Adult female, length $2\frac{1}{3}$ lines.

This Spider is closely allied to *X. hirtus* (Sav.).

The *cephalothorax* has its sides mottled and marked with yellowish white, and yellow-brown of different shades; a broad longitudinal pale whitish band occupies the middle; and along it, from and including the eyes of the hind central pair, runs a yellow-brown bar tapering to a point a little way down the hinder slope.

The *legs* are whitish, mottled and spotted with yellow, and with yellow-brown spots and markings; the tibiæ and metatarsi of the third and fourth pairs have each a distinct, although broken, dark blackish-brown annulus.

The *abdomen* is roundly truncated before, and broader behind than in front; it is of a whitish hue, marked and mottled above with pale yellow-brown and a few blackish markings; on its hinder half these are arranged in two well separated longitudinal lines, and indicate the spaces between the denticulations of the ordinary broad central longitudinal band, which is otherwise scarcely traceable; the sides are rugulose and marked with some rather indistinct oblique rows of brown spots; and the underside is faintly spotted with yellowish-brown; besides some ordinary bristles on the upperside, there are on each side of the fore part a few strong curved clavate ones in an obliquely longitudinal line; these bristles increase gradually in strength from the base to the rounded extremity, something like the form of a racket-bat: there may have been others originally; but if so, they had been rubbed off before capture. Several of these bristles, as well as some others, equally strong but not clavate, are also apparent on the cephalothorax.

A single adult female was found near Alexandria.

Gen. SELENOPS, Duf.

SELENOPS ÆGYPTIACA. (Plate LIX. fig. 10.)

Selenops ægyptiacus, Sav. et Aud. Egypte, p. 162, pl. vi. fig. 6.

This Spider appears to be tolerably abundant in the Nile boats; it used frequently to be seen at night in the cabins and passages of our daha-beah, but, owing to its swift movements and the numerous cracks and crevices at hand, it was very difficult to capture it; I managed however, to obtain three adult and immature females and several adult males. As no other species was met with during my stay in Egypt, I conclude that this is probably the one described and figured by Savigny and Audouin, though the example from which their figure and description were made, being immature, gives but little idea of the characteristics of the species. A more detailed description from the adult form will therefore be useful.

Adult male, length 4½ to a little over 6 lines; adult female, 6 to 7½ lines. The Spider with legs extended covers a width of two inches and three quarters.

The *cephalothorax* is slightly broader at its widest part than it is long; its form is very nearly that of a heart, the ocular region forming the acute point, which, however, is here truncated; it is flat and level throughout, the caput being only a little constricted laterally; its colour is yellow-brown (the caput being darker than the rest, as also are the normal converging grooves and indentations), and it is clothed with hairs and a yellowish grey pubescence.

The *eyes* are unequal in size and disposed on tuberculate black spots along the whole width of the fore margin of the caput; four form a curved row in the middle, the curve directed forwards; and at some little distance from each end of this row is a lateral pair, the eyes of which are very unequal in size, wide apart, and placed obliquely, so that the hinder eye, which is the largest of the eight, is much further from the curved row than the foremost one, which is smallest of the eight: the hinder eyes of the lateral pairs follow the same curve as the four middle ones; but the interval between each and the end one of the central curve is as great as that between the latter and the next to it but one: the interval between the two middle eyes of the central curved row is greater than that between each and the end eye nearest to it; these end eyes are also rather larger than the middle ones. Owing to the flatness of the caput and the nearness of the eyes to its fore margin, the clypeus is very low, no more than equal to the diameter of one of the middle eyes of the central curve.

The *legs* are long, moderately strong, and not greatly unequal in length; their relative length is 2, 3, 4, 1; they are of a dull yellow tinged with brown, and more or less distinctly annulated with darker yellow-brown; they are furnished slightly with a greyish yellow pubescence, which sometimes obscures the darker annulations, and also with hairs, bristles, and spines of various lengths. Each tarsus terminates with two curved claws, which appear to be devoid of pectination; and beneath them is a small but compact scopula of black hairs.

The *palpi* are short, similar to the legs in colour, except the radial and digital joints, which gradually deepen into a dark reddish yellow-brown: the radial joint is nearly of the same length as the cubital, and has, near its outer fore extremity, a prominent dark red-brown somewhat corneous looking apophysis of a tapering, but not very acute, pointed form; on the inner side, towards the fore extremity of the radial joint are several long spine-like bristles; the cubital joint has a single bristle on the upperside at the fore extremity; and the humeral joint has several spine-like ones about the same part; the digital joint is of good size and of a regular oval form, but does not equal in length that of the radial and cubital together by about one half of the latter; the palpal organs are well developed, but not very complex, nor presenting any thing very remarkable in their structure.

The *falces* are moderate in length and strength, rather prominent in front, rounded in profile, and of a deep red-brown colour, paler reddish-yellow near the fore extremity on the inner sides; they are furnished with longish bristly hairs, and appear to have one or two sharp teeth on their inner margins; the fangs are powerful, strongly curved, and of a deep red-brown colour.

The *maxillæ* are strong, straight, and obliquely and roundly truncated at their extremities; their colour is yellow red-brown, softening to pale yellow at their extremities.

The *labium* is equal in length to half that of the maxillæ; it is of an oblong form, rounded at the apex, where it is of a pale yellowish colour, the rest being reddish yellow-brown; the upper half is apparently wider than the lower.

The *sternum* is of a dull yellow colour, and nearly circular in its shape, its fore margin is a little flattened, its hinder extremity notched, and its surface is furnished with hairs.

The *abdomen* is very flat, of an oval form, truncated before, and blunt behind; its colour is a dull testaceous yellow, clothed with hairs of various dull yellowish brown and black hues; those just below the fore margin are upturned, black, and bristly; the upperside is marked with blackish spots, some of which form two longitudinal lines, an oblong marking along the middle of the fore half, following which, on the hinder half, are two or three more or less well-defined transverse lines, the middle portion of the second of these lines being strongly curved; around the margin of the hinder extremity are some small pointed tufts of pale whitish yellow hairs. The spinners are small and short, and, together with the anal tubercle, are partially concealed within a kind of circular sheath, which may be seen when in a rather protruded state in some examples; but in others it is quite invisible; it is probably an exaggeration or more developed form of this peculiarity of which Baron Walckenaer speaks with respect to *Selenops omalosoma*, Duf., and is no doubt a remnant of the once segmented abdomen of the Araneidea. The general form of *Selenops* is strikingly like that of *Phrynus*, the nearest ally to the true Spiders; and it is not surprising therefore that the segmented form of abdomen in the former shonld be more visible in the present than in most other known Spiders.

This Spider is probably common in houses in Egypt, though I did not myself meet with it except in the Nile boats. According to the sailors' account, it preys upon the cockroaches with which these boats are generally infested.

The female differs from the male only in being larger and with shorter and stronger legs. The exceedingly flattened form of this Spider, which runs with inconceivable quickness, and with its legs extended flat on all sides upon the surface, enables it to glide in an instant through cracks and crevices so narrow as to have escaped observation until the Spider disappears, as if by magic, through the wainscoting of the boat. The only way in which I succeeded in capturing this Spider was by observing it when undisturbed and motionless for an instant, and then placing an inverted tumbler over it, when a piece of paper passed carefully behind, put it completely in my power, and enabled me to chloroform and secure it without the slightest damage to the specimen. I have an adult male of this species from Old Calabar, on the west coast of Africa; this example only differs in having the abdominal markings more distinct than in the Egyptian specimens.

Gen. Sparassus, Walck.

Sparassus walckenaerius.

Sparassus walckenaerius, Sav. et Aud. Egypte, p. 159, pl. vi. fig. 1.

Although not rare in Egypt, I was not able to obtain an adult example of either sex of this fine Spider; no doubt their period of maturity occurs later on towards the summer season, the time when my examples were found being in January and February; the length of the largest example met with (an immature female) is 13 lines. Among other situations in which this species was found, it used to occur on board the daha-beah. Waking up on one occasion in the middle of the night, I heard a crunching and crackling noise close to my head; and on looking round, close to my ear was a large Spider, and a still larger Cockroach in deadly struggle together. To stretch out my hand softly and reach a large chip-box close by and enclose them within it was the work of a moment; but on looking in the next morning, the Cockroach had disappeared, all except the harder parts, which were reduced to small fragments. I gave the monster several days to digest his meal and think upon things in general, and then, after a dose of chloroform, consigned him to the collecting-bottle.

Savigny's figure of this Spider is so good that it is impossible to err in the determination of the species.

SPARASSUS COGNATUS, sp. n.

The examples of this Spider met with are not nearly so large as those of *S. walckenaerius*—though, not having met with either species in the adult state, this cannot be considered any certain proof of their relative size when arrived at maturity.

The following differences will serve to distinguish the two species. In the present one the cephalothorax is of a plain yellow colour entirely devoid of the brown markings so characteristic in *S. walckenaerius*; the legs also are completely destitute of the darker annulations which are more or less visible in all the examples I met with of that species; the central eyes also of the hinder row in *S. cognatus* are as widely separated from each other as each is from the hind lateral eye on its side, or perhaps a trifle more widely, while in *S. walckenaerius* the interval between the hind centrals is a trifle less than that between each and the hind lateral on its side. Also the dark markings on the abdomen in *S. cognatus* are of a red-brown colour (often of a bright rusty red), while those on *S. walckenaerius* were of a dull brown hue.

Examples of this Spider were met with both near Cairo and in Upper Egypt. Possibly it may be the immature form of *Sparassus linnæi*, Sav.; but at present I am inclined to think otherwise.

SPARASSUS SUAVIS, sp. n.

Adult male, length $3\frac{3}{4}$ lines; adult female, $4\frac{1}{2}$ lines.

The *cephalothorax* of this Spider is broader than long, though constricted and truncated at its fore extremity; the profile line of the upperside describes a slight and uniform curve; it is of a dull orange-yellow colour, clothed with greyish yellow hairs, and marked faintly with dusky brown in the normal grooves and indentations; the height of the clypeus scarcely exceeds the diameter of one of the fore central eyes.

The *eyes* are in two curved rows, the curves directed away from each other, the hinder row being the most curved and the front row the shorter; those of the fore central pair are largest of the eight; those of the hind central pair are further from each other than each is from the hind lateral on its side, while those of the foremost row are equally separated from each other, the four central eyes describing a square whose fore side is shorter than the rest: the interval between those of each lateral pair is about equal to the diameter of one of them.

The *legs* are long, and moderate in strength; their relative length is apparently 2, 1, 4, 3, or 2, 4, 1, 3; their colour is yellow, the undersides of the femora of the first and second pairs being speckled with small red-brown spots, chiefly disposed in two longitudinal parallel lines; they are furnished with hairs and a few long spines (of different lengths); and the metatarsi and tarsi are furnished beneath with a scopula.

The *palpi* are moderately long and strong; they are similar to the legs in colour; the humeral joints are furnished with a few spine-like bristles towards the fore extremity on the upperside; and there are a few finer long bristles on the other joints: the radial joint is double the length of the cubital, and has a tolerably long, slightly curved, deep red-brown and rather slender apophysis at its extremity on the outer side; this apophysis is of a slightly tapering form, but is obtusely pointed: the digital joint is elongate-oval in form, rather longer than the radial and cubital joints together; its colour is yellow-brown; and it is hairy, terminating in a single small curved claw: the palpal organs are small and simple, and, although characteristic, present no noteworthy processes, nor do they extend more than halfway towards the extremity of the joint.

The *falces* are moderate in length and strength, straight, though projecting a little forwards, and rounded in profile; they are of a yellow-brown colour, paler on their inner sides towards the extremity.

The *maxillæ* are moderately long and strong, nearly straight, and roundly truncated at their extremities, their colour is dull yellow-brown, but pale at the extremities.

The *labium* is very short and small, and nearly semicircular in form, of a dull yellow-brown colour, pale at the apex; and the *sternum* is yellow.

The *abdomen* is of an oblong-oval form; its colour is a dull testaceous, more or less mottled on the upperside with clearer yellow cretaceous spots, and it is thinly clothed with greyish yellow hairs; an ordinary elongated, central, longitudinal yellow-brown marking, defined by a margin of bright red-brown spots, occupies the fore half of the upperside, and its acute termination is continued by a single line of similar spots to the spinners; a few other small spots of the same colour are thinly but pretty evenly dispersed over the rest of the upper surface; the underside is immaculate.

The *female* resembles the male, except in being of a stouter build; the genital aperture is small, of a somewhat heart-shaped and characteristic form, with a blackish red-brown corneous margin.

An adult and an immature male and an adult female were found at the roots of scattered tufts of herbage on the desert near Gebel y Silsilis, in Upper Egypt. Although nearly allied to *Sparassus linnæi* (Sav.), it may be at once distinguished not only by a difference in the relative sizes and position of the eyes and its *much smaller size*, but by the speckled appearance of the abdomen, and the spots on the femora of the first two pairs of legs; the markings on the abdomen of *S. linnæi* being much larger and of a linear character; the palpal organs also, in that species, extend much nearer to the fore extremity of the digital joint, besides being quite different in structure; the radial joint also is shorter in proportion to the cubital, and is armed with two or three long and rather strong spines.

Gen. ARTAMUS, L. Koch (changed to *Artanes* by T. Thorell).

ARTANES BIGIBBA, sp. n.

Immature female, length 2½ lines.

The *cephalothorax* is of the ordinary form; it is of a yellowish grey colour, more or less completely mottled and suffused with yellowish brown, generally leaving a not very distinct pale patch on each side of the hinder part of the caput.

The *eyes* are small and in the usual position; those of the hind central pair are further from each other than each is from the hind lateral on its side; and the relative position of the eyes of the front row is similar; both rows are curved, the convexity of the curve directed forwards; but the front row is much the shortest, and most strongly curved.

The *legs* are long and moderately strong; their relative length being 2, 4, 1, 3; they are of a pale yellowish hue, more or less mottled and suffused with white; and the femora of the first pair are marked rather underneath in front with a strongish longitudinal stripe of deep chocolate-brown (in some examples almost black); in some examples the legs have an obscurely annulate appearance; the tibiæ and metatarsi of the legs are furnished with longish spines.

The *palpi* are similar in colour to the legs; and the humeral joints of those of the first pair have a large black spot underneath the fore extremity.

The *falces* are short, straight, vertical, subconical, of a whitish-yellow colour, tipped with yellow-brown.

The maxillæ and labium are of the normal form, and, with the sternum, of the same colour as the falces.

The *abdomen* is of a somewhat subpentagonal form, truncate before, and broadest towards the hinder extremity, which, however, is of a somewhat pointed form; at its broadest part on either side at the margin is an obtuse gibbosity or protuberance, which, together with the sides and the hinder part, has a wrinkled appearance after preservation in spirit of wine; the colour of the abdomen is greyish white mixed with yellowish grey-brown, and in some examples with chocolate red-brown, assuming an indistinct pattern of a longitudinal central line on the fore half, which emits a short lateral oblique line from either side near its middle, followed by two or three subangular transverse lines, or chevrons.

Four examples, all females and immature, were found among herbage near Alexandria.

ARTANES LUGENS, sp. n.

An immature female of this Spider is rather smaller than those just described of *A. bigibba*, and, although strikingly similar in general form, colouring, and structure, differs from that species in (apparently) the larger size of the eyes of the hinder row; the legs, also, are speckled with dark brown or blackish spots, the longitudinal dark stripe on the fore femora being absent: the *abdomen* also has scarcely any trace of the two gibbosities noticed in that species; the colour of the upperside is a clear greyish white, with a large oblong somewhat rectangular black area reaching from the fore margin to about two thirds of the way to the spinners; this black figure is rather constricted in the middle, and is closely followed towards the spinners by a transverse, slightly angular stripe, or chevron, close behind which is a single central black spot; on either side, close to the spinners, is a short black marginal stripe; the underside is unicolorous, and of a dull greyish white hue.

A single example of this Spider was found near Alexandria. Future researches alone will prove whether or not it is only an abnormally coloured example of *A. bigibba*; at present I consider it to be of a distinct though nearly allied species.

Gen. THANATUS, C. Koch.

THANATUS ALBINI.

Philodromus albini, Sav. et Aud., Egypte, pl. vi. fig. 4.

Adult examples of both sexes of this Spider were found in various parts of Egypt, among low herbage and running on bare spots.

THANATUS LINEATIPES, sp. n.

Adult female, length 3 lines.

This Spider belongs to the group typified by *T. oblongus*, upon which M. Simon has founded a separate genus, *Tibellus*. So far as I can see, the chief, if not the only, valid distinction from *Thanatus* is the elongate narrow abdomen—which seems scarcely enough for the construction of a new genus, although a convenient character for the separation of a group within the genus *Thanatus*.

The whole of the fore part of the present Spider is pale yellow. The *legs* are furnished with a few fine spines; and the femora of the first and second pairs are thinly spotted with minute blackish specks; the tibiæ and metatarsi of the first, second, and third pairs are marked on the hinder sides with a single longitudinal black line, while the same joints of the fourth pair have a black line along both the fore and hinder sides. The *palpi* are immaculate.

The *abdomen* is of an elongate oval form, but not so narrow as that of *T. oblongus*; it is of a pale yellowish colour, closely and uniformly covered with yellow-white cretaceous spots, having only a pale dull-coloured elongate tapering central marking along the middle of the fore half on the upperside; from this marking there issue several fine oblique lines of a similar colour. The relative length of the legs is 4, 2, 1, 3; and the position of the eyes is exactly like that of *T. oblongus.*

A single example was found on a low plant near Cairo.

THANATUS FLAVUS, sp. n.

Adult female, length 2½ lines.

In size, colours, and general appearance this Spider is strikingly like *T. lineatipes*; the form, however, of the abdomen is a little different, tapering more uniformly from the fore part to the spinners; the cephalothorax has two broad but indistinct lateral longitudinal brownish bands, one on each side, leaving a marginal band of the normal ground-colour on either side, of the same width; the legs are more or less thinly speckled with blackish specks, and none of them have the black lines so characteristic in *T. lineatipes.*

The form of the genital aperture also differs from that species; nothing, however, but a drawing of each would render the differences of this aperture tangible for the purpose of specific determination.

Four adult females were found on low plants in a marsh near Alexandria.

THANATUS FLAVESCENS, sp. n.

Immature female, length 3 lines.

Strikingly like both the foregoing species in colours, this one may be at once distinguished by the more attenuated cylindrical form of the abdomen, and consequently its greater length; the abdomen tapers a little, and very gradually, to the hinder extremity, it is of a clear straw-yellow colour, and has the faintest indication of a longitudinal central stripe throughout the upperside, formed by two gradually converging dusky broken lines; the cephalothorax is yellow, slightly speckled with black, chiefly on the caput; the legs are the same in relative length, and have only a very faint indication of black speckling: the two posterior eyes (the laterals of the hinder row) are in the present species further removed backwards from the rest than in the two former, the central pair of the same row being also smaller.

An immature male and female were found on a low bush near Cairo.

Gen. PHILODROMUS, Walck.

PHILODROMUS ADJACENS, sp. n. (Plate LIX. fig. 11.)

Philodromus fabricii, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 310 (exclude reference to Savigny).

Adult male, length 1⅓ line; adult female, 2¾ lines.

Subsequent examination and comparison have led me to believe that the Spider recorded (*loc. cit. supra*) is distinct from *Philodromus fabricii*, Sav. et Aud., differing from it in the more truncate termination of the very conspicuous dark marking on the fore half of the upperside of the abdomen, as well as in the relative length of the legs; in the present Spider this is 4, 3, 2, 1, while in *P. fabricii* it is 4, 2, 3, 1. The structure, however, of the palpal organs of the male is not very unlike the figure shown in Savigny's work.

The *cephalothorax* is of ordinary form, of a yellowish grey colour, with two very distinct broad lateral longitudinal (but not marginal) dark-brown bands; these bands, however, touch the margin at the point where they terminate in front, close to the junction of the caput and thorax, behind which their lower margin is rather strongly denticulate.

The *legs* are very long and slender; their relative length is 4, 3, 2, 1; and their colour is pale whitish-yellow, more or less spotted and marked beneath the femora with greyish yellow-brown; and they are furnished with hairs and a few inconspicuous spines.

The *palpi* are similar to the legs in colour; the radial and cubital joints are short, but of equal length; and at the outer extremity of the former is a slightly curved, tapering, narrow, pointed brown apophysis; the digital joint is oval, rather longer than the radial and cubital joints together; the palpal organs are simple in structure, with a slightly curved pointed corneous process, which begins on their inner side, and projects, with a sharp black point, from their extremity.

The *abdomen* is oval, and projects well over the base of the cephalothorax; its fore extremity is rounded, and its posterior extremity blunt-pointed; it is of a dull cream-grey colour, with the normal marking on the fore half of the upperside very distinct and well defined and of a deep brown colour, with an angular point near the middle on each side, and truncated or blunt-pointed at its hinder extremity, from each corner of which there projects sometimes a very short oblique dark brown line or point; the sides of the abdomen are obscurely marked and mottled with brown; but the rest of the surface scarcely shows any trace of colour in markings.

The *female* resembles the male in colours and markings, but is much larger; and the legs are shorter, and their relative proportion appears to differ, being in this sex 4, 2, 3, 1; the difference, however, if any, between those of the second and third pairs is exceedingly slight.

Adults of both sexes were found in desert places near Alexandria, where they were very difficult to be seen except when moving, owing to the exact adaptation of their colours to the surface of the ground; and when moving they were exceedingly difficult to capture, owing to the swiftness of their movements.

I feel no doubt that these are identical with the species recorded from Palestine, although in all the male specimens and some of the females obtained there, besides the markings above noticed, the remainder of the upper surface of the abdomen is marked more or less distinctly with yellowish brown, forming on the hinder half a somewhat regular, tapering pattern, denticulated on its outer margins, sometimes divided by an indistinct pale longitudinal stripe, and sometimes with several transverse curved or slightly angular dark lines, more or less visible; the *cephalothorax* also often has the space between the dark lateral bands occupied by a longitudinal tapering dark stripe; and the legs are of a generally darker and more suffused hue. In fact, it would be correct to describe the Egyptian examples as bleached or washed-out specimens of the Palestine species. I can, however, see no difference between them in any structural points.

PHILODROMUS MEDIUS.

Philodromus medius, Cambr. Spid. of Palest. & Syria, P. Z. S. 1872, p. 311.

An adult male, with females, both adult and immature, were found in Upper Egypt, upon the lower boughs of the sont acacia.

PHILODROMUS CINEREUS, sp. n.

Adult female, length 2 lines.

The *cephalothorax* is pale yellow, the sides (except a narrow marginal white line) yellowish brown, divided longitudinally by a broken curved line of three indistinct whitish elongate spots, and marked along the course of the normal indentations with converging black lines, among which are a few other small spots of the same colour; the upper part of the caput is dull yellowish brown, margined strongly behind with white, on the posterior edge of which are two or three deep-black-brown spots; the clypeus is white, and its height is equal to half that of the facial space; the ocular area is also white.

The *eyes* are in the usual position, but are rather more unequal in size than usual, those of the fore central pair being decidedly the largest and considerably further from each other than each is from the fore lateral eye on its side, the interval between each and the latter being rather less than the latter's diameter; the four central eyes form a square whose hinder side is longer than the rest.

The *legs* are rather long and slender, their relative length is 2, 4, 3, 1; they are pale yellow in colour, annulated and speckled more or less with blackish brown, and furnished sparingly with hairs and a few very fine inconspicuous spines.

The *palpi* are moderately long, slender, and similar to the legs in colour.

The *falces* are of moderate length, but slender, and of a brownish-yellow colour.

The *maxillæ* and *labium* are normal in form, and similar to the falces in colour, but tipped with a paler hue.

The *sternum* is yellow, marbled with white.

The *abdomen* is rather large, broader behind than before; it is of an ashy grey colour, thickly suffused with darker grey and black specks on the upperside; the normal marking along the centre of the fore half is of a blackish grey colour, well defined by a black marginal line, truncate at its hinder extremity, and emitting an indistinct black oblique line from either side of its broadest part, which is slightly angular; the hinder part is marked by some obscure whitish markings and spots disposed in opposed oblique broken lines on either side; the genital aperture is characteristic, and of a somewhat oval or kidney-shape, divided by a narrow longitudinal septum; a little way underneath, in front of the spinners, is a small but very distinct transverse slit or opening, probably the orifice of a portion of the tracheal system.

A single example only was found near Cairo. Probably other examples would show some variation in the distinctness of the markings; but even from this one example it appears to me to be a very distinct species.

Philodromus venustus, sp. n. (Plate LIX. fig. 12.)

Adult male, length not quite 1½ lines; adult female, rather more than 2 lines.

The *cephalothorax* of this pretty and very distinct species has a broad central longitudinal yellow band, as wide as the length of the hinder row of eyes, including most of the ocular area, and with a paler angular bar at the hinder part of the caput, the angle directed backwards; the sides and clypeus, excepting a narrow marginal cream-white line, are of a rich dark brown colour, somewhat curvidentate on the lower edge; and on either side of the caput, just below each end of the ocular area, is a yellowish spot; the height of the clypeus equals half that of the facial space.

The *eyes* are in the ordinary position; those of the fore central pair are rather larger than the rest, and are much further from each other than each is from the fore lateral eye on its side; the four central eyes describe a square whose fore side is the shortest.

The *legs* are long and rather slender, their relative length being 2, 1, 4, 3, or 2, 4, 1, 3; they are yellow, broadly banded and otherwise slightly marked with a brightish brown, but most distinctly and darkly on those of the third and fourth pairs; they are also furnished with hairs and a few fine inconspicuous spines.

The *palpi* are rather short, and similar in colours and markings to the legs; the radial and cubital joints are short, but of about equal length, the former being furnished with several spines and a small pointed corneous apophysis at its extremity on the outer side; the digital joint is rather long and of a narrow oval form and yellow-brown colour; the palpal organs are very simple, consisting apparently of an oval lobe without any noticeable processes.

The *falces* are moderate in length and strength, straight and subconical, of a yellow colour, with two reddish black-brown patches in front of each, one near the base, the other towards the extremity; in fact the base is more or less reddish black-brown all round.

The *maxillæ* and *labium* are of the usual form and, with the *sternum*, of a pale yellow colour; the latter has an elongate triangular black spot at its hinder extremity.

The *abdomen* is of an oval form, pointed behind and somewhat flattish above; it is of a bright buff colour, the upperside margined on each side, but not quite to the hinder extremity, with a deep-black-brown well-defined stripe, edged on the inner side with cream-white; from the fore extremity a short black-brown central stripe runs a little way along the ordinary marking, which is of a much paler colour and ill defined; and from a little way above the spinners a narrow cream-white stripe runs nearly to the extremity of the ordinary marking; the ground-colour of the abdomen deepens in its hue on each side of this white stripe, becoming of the same colour as the lateral stripes at its hinder extremity; the underside is pale buffish yellow, marked with two longitudinal brownish lines, which converge a little towards each other as they get near the spinners.

An adult female differed only in being of a darker and more suffused hue, the different lines and markings being not quite so vivid.

An adult example of each sex, with an immature female, were found on the branches of the sont acacia, during the ascent of the Nile, between Cairo and Manfaloot.

Fam. LYCOSIDES.

NILUS, gen. nov.

Cephalothorax short, broad, and with very slight lateral constrictions at the caput.

Eyes not very large nor very unequal in size, occupying the whole width of the upperside of the caput, in two not very widely separated, and almost equally curved, transverse rows; the convexity of the curves is directed forwards, but the front row is the shortest.

Legs tolerably strong, not very long nor very unequal in length; their relative length 4, 1, 2, 3, or 1, 4, 2, 3; each tarsus ends with three curved claws.

Maxillæ moderately long, straight, broader at their extremity than at their base, and rather roundly truncated.

Labium short, scarcely half the length of the maxillæ; lateral margins slightly curved, and apex rounded,

Abdomen short, oval, rather pointed behind, and projecting considerably over the base of the cephalothorax.

NILUS CURTUS, sp. n. (Plate LX. fig. 13.)

Immature female, length rather more than 2 lines.

The *cephalothorax* has a rather abrupt hinder slope, and the profile-line of the caput and thorax to the hinder slope is level; its colour is yellow-brown, the ocular area, including a large somewhat quadrate area behind it, being yellow, the quadrate area having two indistinct brownish patches near its hinder part; the clypeus is yellow, with two brown patches opposite the middle of the base of the falces, and its height scarcely equals half that of the facial space; on each side of the cephalothorax is a well-defined, straight, yellow, but not very broad stripe, reaching from the hinder extremity quite to the insertion of the falces, and below it is a broad yellow-brown marginal band.

The *eyes* are seated, in the form of a crescent, on largish black tuberculate spots; the lateral eyes of the hinder row are the largest, and the fore laterals the smallest of the eight; the interval between those of the hind central pair is rather less than that between each and the hind lateral on its side; while the interval between those of the fore central pair is rather greater than that between each and the fore lateral on its side; the length of the front row is equal to that formed by any three eyes of the hinder row; and the four central eyes form a square whose fore side is shortest and its hinder side slightly the longest.

The *legs* are yellow, indistinctly annulated and marked with dusky brown, and furnished with long spines as well as with hairs and bristles.

The *palpi* are pale yellow, moderately long, and furnished with hairs, bristles, and a few spines.

The *falces* are vertical and strong; their colour is pale yellow, with a broad brownish band along the middle of their fore side, not reaching, however, to their extremities.

The *maxillæ* and *labium* are pale yellow.

The *sternum*, which is nearly round and pointed a little behind, is also of a pale yellow colour, but broadly margined on each side with dark blackish brown.

The *abdomen* has on the upperside a broad longitudinal dark brown band, as wide as the whole width of the abdomen at its fore extremity, but narrowing gradually to the spinners, near which its margins are a little denticulated; this band has the normal longitudinal macula along the middle of its fore part indistinctly defined, of a brownish-yellow colour, and pointed at its hinder extremity; and along either side of this are two or three more or less distinct dull whitish spots; the central tapering band is well defined on each side by a broad yellowish white marginal band; the sides are marked more or less with black-brown streaks and spots; and the underside is dull black-brown, divided by a longitudinal central yellowish bar (which tapers to a point behind), and margined by a bar on each side of a similar colour; the spinners are short and strong, those of the inferior pair being rather stronger, but equal in length to the superiors.

Four immature examples of this Spider were found on rushes in a marsh near Alexandria, and are of very great interest as forming a transition from *Dolomedes* to *Ctenus* and yet wanting such decided characters as would include them in either of those genera. The position of the eyes is very like that of *Sparassus*; and this, with the strongly laterigrade legs, shows an affinity to the Thomisides; but from the Spiders of this family they are separated by the presence of three instead of two tarsal claws. The general appearance, from the colours and markings, is exceedingly like that of *Dolomedes fimbriatus* (C. Koch); but the position of the eyes distinguishes it at a glance from that well-known species. The approximation to *Ctenus* is seen in the approach of the fore lateral eyes to the hind lateral ones; by which the front row is strongly curved instead of being straight or nearly straight as in *Dolomedes*; from this last genus the near approach together of the two rows also very plainly distinguishes it. From all these, and other considerations as well, it has appeared to me necessary to constitute a new genus for its reception.

Gen. PIRATA, Sund.

PIRATA LEOPARDUS.

Pirata leopardus, Sund.
Lycosa cambrica, Bl. Brit. & Irish Spid. p. 32, pl. ii. fig. 14.

Adults of both sexes were found in a marsh near Alexandria; and I can find no structural difference in the male palpi from those parts of *L. cambrica*, Bl. The colours, however, of the abdomen are more distinct and more strongly contrasted, while their disposition is the same.

PIRATA PROXIMA, sp. n.

Adult female, length 4 lines.

The *cephalothorax*, looked at in profile, has the thoracic region considerably humped, and the hinder slope very steep and abrupt; it is clothed with hairs, and the upper part, especially of the caput, is furnished with numerous erect blackish bristles; the colour is yellow-brown, margined with a black line, immediately above which is a narrow band clothed densely with short white hairs, a little way above which, again, is a broader but not very regular or continuous yellowish band: from the posterior eyes a broad yellowish tapering band runs to the hinder extremity, having within it a largish yellow-brown marking, fining off into the red-brown line which denotes the thoracic junction; this yellow-brown marking is again divided longitudinally by a yellowish line, which also runs through the middle of the ocular area.

The *eyes* occupy an area rather broader than long, the length being measured from the lateral eyes of the front to those of the hinder row, ignoring the upper angle of the caput, just below which the eyes of the middle row are placed; the length of the front row is equal to that of the middle one, and its two central eyes are a little further from each other than each is from the lateral eye next to it, and are smaller than the eyes of the hinder row, the fore laterals being the smallest of the eight.

The *legs* are strong, but not very long; their relative length appears to be 4, 1, 3, 2, though the difference between those of the first and third pairs is very small, if any; they are of a dull brownish-yellow colour (the femora only having the faintest traces of darker annulations on their uppersides), and are furnished with hairs, bristles, and spines; the latter are the strongest and most numerous on the tibiæ and metatarsi of the third and fourth pairs.

The *falces* are strong, and of a dark reddish yellow-brown colour.

The *maxillæ* are yellow-brown, tinged with reddish; the *labium* dark blackish brown, with a pale apex; and the *sternum* yellow, marked with a few not very distinct dusky brown blotches. All these parts are of normal form and furnished with bristly hairs.

The *abdomen* fits well up to the hinder slope of the cephalothorax; it is of a dull yellow olive-brown colour, paler on the under than on the upperside; the normal macula along the middle of the fore part of the upperside is indistinctly visible and of a dusky brownish hue, angular on each side near the middle and blunt-pointed at its hinder extremity; on either side of this macula, but free from its margins, are two dark spots in a longitudinal line, furnished with bluish-white hairs, the four spots forming nearly a square; four or five other similar spots on each side form two longitudinal lines on the hinder half of the abdomen, the lines converging towards the spinners; these spots are connected into pairs by very faint dusky angular transverse lines, or chevrons, the apex of that which joins the first two spots touching the hinder extremity of the normal macula on the fore part; the sides are mottled with small irregular patches and spots of short bluish-white hairs. A series of examples would probably show some variety in the distinctness of the pattern on the abdomen.

A single example only was found in a swamp near Alexandria. It is very nearly allied to *Pirata piratica*, C. Koch, as well as to *P. piscatoria*, C. Koch, and *P. hygrophila*, Thor. From the first of these the larger size of the spider, as well as the dark colour of the normal macula on the abdomen, will distinguish it at a glance; from the second, which is of about the same size, the much narrower white marginal border of the cephalothorax, as well as the lateral yellow bands, will, among other differences, serve to distinguish it easily; while from the third species it is at once separated by its greater size and immaculate (or almost immaculate) legs. It is probably an abundant Spider in the marsh referred to and in others near it; but I was unfortunately unable to pay this locality another visit after the discovery of the single example now described.

Gen. Trochosa, Koch.

Trochosa partita, sp. n.

Adult female, length 5 lines.

The *cephalothorax* of this handsome Spider is rather drawn out, though not suddenly constricted laterally at the caput; it is of a yellow-brown colour, margined with a black line and a tolerably regular though not unbroken yellow band; the middle of the upperside has a somewhat star-shaped marking, formed by short yellow stripes converging to the thoracic junction; there are also other yellow patches of different sizes on the caput behind the ocular area, which is strongly suffused with black-brown, leaving, however, a clearish yellow space between the eyes of the hinder row.

The *eyes* are in the usual position, the ocular area being about equal in its length and breadth; the fore centrals are nearly, if not quite, as large as the eyes of the hinder row; the front row is longer than the middle one, and its eyes are separated by as nearly as possible equal intervals.

The *legs* are moderate in length and strength, their relative length being, as nearly as I could ascertain, 4, 1, 2, 3; their colour is yellow, faintly annulated and marked with dusky brown, and furnished with hairs and spines.

The *falces* are of a yellowish colour, clouded with yellow-brown towards their extremities; the *maxillæ* are yellow, and the *labium* dark yellow-brown, pale at the apex. The *sternum* is yellow, divided longitudinally by a well-defined and very distinct nearly black stripe.

The *abdomen* is of an elongate oval form, and clothed with dull yellowish hairs; the normal maculæ on the fore part, as well as the ordinary angular bars, or chevrons, on the hinder part (which last are spotted with small black points), are well defined, and vary in colour from yellow to reddish yellow-brown; besides which there are various lines and spots of yellowish and white, the ground-colour being nearly black, and the whole forming an exceedingly pretty and variegated pattern; the sides are yellowish, marked with short blackish spots and streaks; and the underside is also yellow, marked with three broken blackish lines.

An immature male and two adult females were found near Alexandria. It may be distinguished from all other European and Egyptian Spiders known to me by the yellow sternum bisected by a longitudinal black stripe.

TROCHOSA DEPUNCTA, sp. n.

Adult male, length 3½ lines.

This spider is very closely allied to *T. picta*, Hahn, but may be distinguished by its less distinct pattern and paler colours; the structure also of the palpal organs is different. The whole of the underside also, except the sternum, is of a pale yellow colour without any markings, the sternum being blackish brown, with a yellow longitudinal line dividing the fore half; while the underside of *T. picta* is invariably (in my experience) of a sooty black hue, and the annulation of the legs very strong and distinct. Possibly this Spider may be the *Lycosa nilotica* of Savigny; but as there appears to be considerable doubt upon the point, I have thought it best to give it here as a distinct species.

An adult male and two females were found near Alexandria.

TROCHOSA PILIPES.

Lycosa pilipes, Luc. Expl. en Algérie, p. 109, pl. ii. fig. 8.

Numerous examples of both sexes of this Spider were found under stones on the damp sandy flats bordering the Nile in Upper Egypt; and I believe them to be identical with the Spider described and figured by H. Lucas (*loc. cit.*). It is very closely allied to examples of *Trochosa lynx*, Koch, received from Dr. L. Koch, but is, I think, decidedly of a different species. The numerous long erect bristles and hairs on the legs (and, in fact, on the whole Spider) are very characteristic.

TROCHOSA VIRULENTA, sp. n.

Adult male, length 6 lines; adult female, 7 lines.

This Spider is nearly allied both to *T. pilipes*, Luc., and *T. lynx*, Koch, but may be distinguished by its larger size and bolder though very similar pattern on the abdomen. The palpi also of the male differ very perceptibly in their greater strength, their shorter cubital and radial joints, and the larger size (especially the greater width) of the digital joint; and the palpal organs are different in their structure. The legs also are far less distinctly annulated, and are quite destitute of the long erect hairs so conspicuous in *T. pilipes*.

Two adult males and an adult female were found in the neighbourhood of Cairo.

TROCHOSA URBANA, sp. n. (Pl. LX. fig. 14.)

Lycosa agretyca, Savigny, Egypte, p. 147, pl. iv. fig. 6.

This Spider, although nearly allied to *Trochosa* (*Lycosa*) *agretyca* (Walck. & Blackw.), is quite distinct from that species, and is in fact still more nearly allied to *L. campestris* (W. & B.). From the former the distinctly marked bright yellow colour of the normal macula on the fore half of the abdomen, as well as its pointed hinder extremity, will distinguish it at a glance; while from the latter, with which it agrees in size, and which it resembles greatly in appearance, it may easily be separated by the character of the central longitudinal yellow band on the cephalothorax. This in *T. campestris* is broad, tapering towards its hinder extremity, strongly constricted at the hinder part of the caput, and its fore part marked with two longitudinal parallel brown lines; whereas in *T. urbana* the central band is narrow and of uniform width from the hinder slope to the middle of the ocular area, having a pale yellowish longitudinal line on each side of its fore part near the eyes. Also, in all the examples found, the digital joint of the male is pale-coloured instead of being of a deep reddish brown as in *L. campestris*. The palpal organs of the male also differ in structure.

Adult and immature examples of both sexes were not infrequent among low plants and other herbage in a marsh near Alexandria.

TROCHOSA EFFERA.

Lycosa effera, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 318.

An adult male and female were found in the neighbourhood of Cairo, differing from the Palestine specimens only in size, the Egyptian examples being the largest. The adult male measures $5\frac{1}{2}$ lines in length, and the female 7 lines. An immature female was also found near Alexandria.

Gen. TARENTULA, Sund.

TARENTULA TARENTULINA.

Lycosa tarentulina, Savigny, Egypte, p. 143, pl. iv. fig. 2.

Immature examples (of the female only) were found in abundance near Alexandria, in their cylindrical holes on waste and desert places; the hoary-grey ground colour, and the black underside of the abdomen distinguish this Spider from all others of the family found by myself in Egypt.

TARENTULA TRUCULENTA, sp. n.

Female immature, length rather over 5 lines.

This Spider is very nearly allied in colours and general appearance to *Trochosa effera*, Cambr.; it may, however, be distinguished by the first row of eyes being distinctly shorter than the second, and by the marking of the falces, which in the present species are yellow, or orange-yellow-brown, with a longitudinal, well-defined, dark reddish-brown band, which runs in front from their base to their extremity, and appears to continue the broad dark brown bands running throughout the length of the cephalothorax and including on each side the lateral eyes of all the three rows. The rest of the cephalothorax is yellow; the central yellow band is abruptly constricted at the hinder part of the caput, whence it narrows gradually to the hinder extremity of the thorax. On the caput this band has two longitudinal parallel brown lines, which are often imperfect, and sometimes obsolete.

The *eyes* of the front row are very small (the centrals not very much larger than the laterals), and separated by as nearly as possible equal intervals; the laterals of this row are seated on strong tubercles, and have a rather downward direction; the height of the clypeus equals a diameter of the central eyes; the ocular area is not much longer than broad; and the length of the hinder row does not very much exceed that of the middle row.

The *legs* are yellow, immaculate, excepting in some few examples where the femora show a very faint trace of dusky annulations.

The *maxillæ* and *labium* are yellow, the latter clouded with brown towards and at its base; the *sternum* also is yellow, with two or three indistinct dusky longitudinal markings.

The *abdomen* is of a rather elongate oval form, its colour varies from yellow to pale yellow-brown; and the ordinary Lycosid markings are more or less distinctly traced by blackish brown broken lines and spots, the spots extending in broken oblique lines over the sides; the abdominal pattern in this, as in almost all other species of the family, is often greatly obscured by the hairs with which it is covered; immersion in fluid, however, brings out the pattern distinctly.

Eight or nine examples were found near Alexandria.

Tarentula tremens, sp, n.

Adult female, length scarcely 4 lines.

Cephalothorax dull orange-yellow, clothed with yellowish grey adpressed hairs; a broad brown longitudinal band occupies each side, leaving a narrower yellow marginal one and a much broader central one; the latter is sharply dentated on its inner margins at the hinder part of the caput, the foremost denticulation representing the ordinary constriction, where the lateral dark bands break in upon the central pale one; this in the present Spider is almost of uniform width from the eyes to the beginning of the hinder slope, which is not excessively steep, forming an angle of about 45°.

The *eyes* of the front row form a line perceptibly shorter than those of the second row; the centrals of the second row are a little larger than the laterals, and the interval between them is rather greater than that between each and and the lateral eye nearest to it; those of the second (or middle) row are very large, and separated from each other by scarcely a diameter's interval; and yet the line formed by them is but a trifle less than that formed by the hinder row. The ocular area is longer than broad.

The *legs* are rather short and strong; their relative length apparently 4, 3, 1, 2; they are of a bright yellow colour, tinged with reddish brown towards the extremities of the first two pairs, and almost immaculate, the traces of annulation being scarcely perceptible; they are furnished sparingly with hairs and bristles, and a few rather short spines.

The *falces* are strong and of a rich deep red-brown colour, clothed sparingly with yellowish hairs and dark bristles.

The *maxillæ* are darkish yellow-brown, tinged with red, the extremities being pale yellow.

The *labium* is wholly dark red-brown, and the *sternum* yellow.

The *abdomen* is of a dull orange-yellow (paler underneath), and pretty thickly clothed with coarsish yellow-grey adpressed hairs, among which are a few prominent blackish bristles. The ordinary Lycosid markings are scarcely traceable, being only just indicated by a few minute black-brown spots. The sexual orifice is large but of simple form, consisting of two rather oblique oval apertures near together, but in opposition, at the hinder part of a large, nearly circular, red-yellow, somewhat corneous-looking convexity.

A single example of this very distinct Spider was found near Alexandria.

Gen. LYCOSA, Latr.

LYCOSA UNGULATA, sp. n.

Immature female, length 5 lines.

This Spider is certainly very closely allied to *Lycosa arenaria*, Sav. (resembling it in the remarkably long and slightly curved superior tarsal claws, by which it may be easily distinguished from all others known to me); the description, however, given of the colours and markings lead me to conclude that it is of a different species.

The *cephalothorax*, when seen in profile, is rather depressed behind the occiput; and the height of the clypeus considerably exceeds the diameter of the fore central eyes; this part and the ocular area are dark brown; but being, with the rest of the cephalothorax, covered with yellow-grey pubescence, its colour is not so apparent; there are also on these parts numerous long bristly hairs; the rest of the cephalothorax is of a bright straw-yellow colour, with two broad longitudinal yellow-brown bands, each of which includes at its fore extremity the lateral eyes, on its side, of the hinder and middle rows. The central yellow band is very broad, but strongly constricted (or indented) at the occiput, forming a pretty regular, large, transverse oval behind the posterior eyes; and behind this constriction the margins of the band are somewhat denticulate, and emit some pale divergent lines across the two yellow-brown bands, following the directions of the thoracic indentations; the thoracic junction is indicated by a longish red-brown indented line.

The *eyes* are in the usual position; those of the posterior and middle rows form nearly a square, the fore side shortest and the hinder side longest. These four eyes are very large, the posterior ones being rather less than the anteriors; the two centrals of the front row are larger than the laterals, and further from each other than from the lateral nearest to it, the row itself being shorter than the middle row.

The *legs* are long and moderately strong; their relative length apparently 4, 3, 1, 2, those of the fourth pair greatly exceeding the rest; they are of a straw-yellow colour; the femora are marked on their outer sides with a broken longitudinal stripe, and faintly annulated with pale yellow-brown; they are furnished with hairs and numerous pale, but not very long nor strong spines; and each tarsus terminates with three pale claws, of which the superior pair are very long and slightly curved, their hinder part finely pectinated; the inferior claw is exceedingly short, and bent almost perpendicularly downwards; the extremities of the tarsi* (which are subdivided, giving the legs eight joints instead of seven) are also furnished all round with longish slender spines.

The *palpi* are of moderate length; their colour is yellow, and the terminal claw long, slightly curved, and minutely pectinated.

The *falces* are moderately long and strong; they are of a yellow-brown colour, with a dark brown longitudinal band in front, nearly as wide as the falces, and they are furnished in front with numerous hairs and long bristles.

The *maxillæ* and *labium* are of a dull brownish hue, tipped with pale yellow.

The *sternum* is nearly circular, and of a uniform pale straw-yellow colour.

The *abdomen* is of a yellow colour, rather darker on the sides, spotted and marked with brownish black, and also with some spots, lines, and patches of white pubescent hairs; these latter give the Spider a remarkable appearance, the darker markings being much obscured by the general yellowish hairy clothing; when examined closely, however, and especially when in spirit of wine, the usual characteristic markings become apparent enough. The normal longitudinal macula on the fore half of the upperside is of a yellowish brown hue, pointed behind, and with some black marginal spots; and the transverse chevrons are formed by more or less perfect blackish lines; the sides are spotted and marked with blackish.

Three immature females of this Spider were found at the roots of stunted herbage on the desert near Jebel y Silsilis, in Upper Egypt.

LYCOSA FIDELIS.

Lycosa fidelis, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 319.

Lycosa galerita, L. Koch, Ægypt. u. Abyss. Arachn. 1875, p. 69, Taf. vii. fig. 1.

The peculiar structure of the palpal organs of the male of this Spider, well represented in Dr. Koch's figure (*loc. cit. supra*), with some other striking characters, render its identity with *L. galerita*,

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* The subdivision of the tarsi of this and another allied Sinaitic species (*L. prœlongipes*, Cambr.) will probably necessitate the formation of a new genus for their reception.

L. K., pretty certain. Adults of both sexes were frequent both in the neighbourhood of Cairo and Alexandria.

Lycosa injucunda, sp. n. (Plate LX. fig. 15.)

Adult male, length rather over 3 lines.

This Spider is very closely allied to *L. fidelis*, Cambr., and is found in the same localities; it may, however, be at once distinguished by the generally duller and less distinct colours and markings in both sexes, especially in the adult males, whose cephalothorax has distinct, though irregularly edged and slightly interrupted, lateral yellow bands, leaving a broken marginal brown band on each side; the central longitudinal yellow band is also quite distinct, strongly radiated at the thoracic junction, and much constricted at the occiput, whereas in *L. fidelis* the central band is scarcely traceable and the lateral ones quite obsolete.

The *eyes* of the hinder row are further apart than in *L. fidelis*; in other respects, except being generally larger, the eyes are very similar in both species.

The *legs* are dull yellow, annulated with brown, but not nearly so distinctly as in *L. fidelis*.

The *palpi* of the adult male differ remarkably in the two species, those of *L. fidelis* having the humeral and digital joints black, and the cubital and radial joints clear yellow, the fore part of the latter, as also the base of the digital joints, clothed with white hairs; the cubital and radial joints are also rather short, and of equal length; while in the present Spider the humeral joint is dull yellow, like the cubital and radial, these two latter being longer and differing in their relative length, the radial being distinctly longer than the cubital, and (as well as the digital, which is of a dark brown colour, and terminates with two strong curved claws) entirely destitute of the white hairs which in *L. fidelis* form so striking a contrast to the black digital joint. The palpal organs of the present species are also of much less complex structure than those of *L. fidelis*: no description would avail to make their structure intelligible; this can only be done by good figures on a large scale; one character, however, of those of the present Spider is unusual, if not unique—the large basal corneous lobe or process being clothed with hairs.

The underside of *L. fidelis* is much darker than in the present Spider; this is especially noticeable in the sternum, which in the former is deep brownish black, and in the latter pale dull yellowish, with sometimes two longitudinal dusky brownish curved stripes.

Adult and immature examples of each sex were found both near Cairo and Alexandria. The females of the present Spider may be distinguished from those of *L. fidelis* by the much smaller and differently formed genital aperture.

Lycosa iniqua, sp. n.

Adult female, length nearly 4 lines.

This Spider bears considerable general resemblance to *L. injucunda*, but may be separated at a glance by the large size of the eyes of the middle row; these are more than double the size of those of the hinder row, and form very nearly as long a line as the latter. The sides of the cephalothorax are rather depressed; a broad, longitudinal, brownish yellow band, radiating at the thoracic junction, occupies the middle; and the lateral margins have a broken band of the same colour, the intermediate spaces forming two broad brown bands; the ocular area is black-brown; and the whole has a dense clothing of yellowish grey pubescence.

The *legs* are rather short, though not very unequal in length, their relative length being apparently 4, 3, 1, 2; they are yellow, the femora banded with black-brown, and the femoral and base of the tibial joints slightly marked with a similar colour.

The *falces* are brownish yellow, blackish near their base in front, and marked obliquely towards the extremities with a dusky brown band.

The *sternum* is black-brown, with a broad, irregularly edged, yellow, longitudinal central band, which does not, however, reach the hinder extremity.

The *abdomen* is dull blackish brown above, all the normal characteristic markings being much obscured; the normal central marking on the fore part is bifid at its hinder extremity, and has an angular point, directed backwards, near the middle of each side; the hinder part has two nearly parallel longitudinal rows, each of three or four rather conspicuous pale spots, furnished with whitish hairs; and between them is an indistinct series of yellowish angular bars or chevrons; the sides are marked with black-brown spots and broken lines, which are more thinly dispersed towards the underside, which is yellow, margined with black-brown, and divided by a longitudinal central dark brown bar.

A single example was found under a stone near Alexandria.

LYCOSA INQUIETA, sp. n.

Adult male, length 2 lines.

Cephalothorax, deep brown, with a broad, longitudinal, central brownish yellow band, tapering slightly from the eyes to the hinder extremity, and, together with the space included by the four large posterior eyes, covered thickly with yellowish grey hairs; there is also on each side a narrow yellowish lateral stripe, interrupted near the middle, and situated a little way above the margin; the *clypeus* is brownish yellow.

The *eyes* of the middle row do not appear to be larger than those of the hinder one; but the line formed by them is shorter than that formed by the latter, and also a little shorter than that formed by the laterals (on each side) of these two rows; the centrals of the front row are larger than the laterals, and are much further apart from each other than each is from the lateral eye on its side.

The *legs* are long, and tolerably strong; their colour is dull yellowish, faintly annulated with dusky brown.

The *palpi* are also dull yellowish in colour, the digital joint being brown; the radial joint is rather larger and stronger than the cubital, and (together with the digital) pretty densely clothed with black bristly hairs; the palpal organs have a strong, pointed process at their fore part, the point directed forwards and outwards; between the base of this process and the outer margin of the digital joint is a small bluntish corneous, black-tipped point; and near the middle of the large basal lobe is a small prominent blunt-pointed process, with another of equal length springing at right angles from its base; on the outer side the digital joint has no terminal claw.

The *falces* are dull yellowish, suffused with dusky brown.

The *maxillæ* and *labium* are pale yellow, and the *sternum* black-brown.

The *abdomen* is broader behind than before; it has all the characteristic markings on the upperside indicated by black lines and spots on a reddish yellow ground; the normal marking on the fore half is rather blunt-pointed behind, and broadest near the middle, whence on either side an oblique black line issues; the sides are dull yellow, marked with short black lines and spots, some of which are disposed in oblique rows; the underside is pale yellow.

A single example of this small but very distinct species was found near Alexandria; in its colours and pattern it is very like *Tarantula miniata*, Koch, but is much smaller.

LYCOSA INOPINA, sp. n. (Plate LX. fig. 16.)

Lycosa proxima, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 316 (nec *L. proxima*, Koch).

A careful comparison assures me of the identity of the Spider quoted in the above synonym with the species now recorded; and I have now but little doubt that it is distinct from *L. proxima*, Koch, though nearly allied to it; the certainty, however, of this can only be ascertained by comparison of typical examples of both species; meanwhile it seems best to describe the present species as a distinct one.

The length of the adult male is a little over 2 lines; and it belongs to the *monticola* group. The central yellow longitudinal band on the cephalothorax is not very broad; it is widest at the thoracic junction, comes abruptly to a point (sometimes obsolete) immediately behind the ocular area, and tapers to a point at its posterior extremity; the lateral yellow bands are well defined, but irregular on the edges, and interrupted, leaving also a distinct brown marginal stripe; the intermediate spaces form two broad dark yellow-brown bands marked pretty distinctly with converging black lines; these bands are of a bright orange (and sometimes lemon) yellow colour; the ocular area is black.

The *eyes* differ little, if any thing, in size and position from those of *L. inquieta*, Cambr.

The *legs* are long and moderately strong; they are yellow, slightly marked and faintly annulated with dusky brown. Some have scarcely any markings or annulation visible.

The *palpi* are black; the radial and digital joints clothed densely with hairs; the palpal organs are rather simple, the chief characteristic prominent process near the centre is short, stout, obtusely pointed, and with a slightly pointed spur at its base nearly as long as the process itself, with which it forms by its direction a very obtuse angle.

Falces black-brown, but in some examples (probably those more recently come to maturity) yellow, merely clouded with dusky brown.

Sternum dusky brown to black, with a short yellow central stripe or marking.

Maxillæ and *labium* yellowish dusky brown to black, with the extremity of a clearer hue.

Abdomen black, or nearly so above, with the normal markings on the fore half of the upperside broad and somewhat angular in the middle, fining to a point behind, and of a bright orange or lemon-yellow; this is followed to the spinners by a series of strong but short angular bars, or chevrons, generally confluent, decreasing in size as they go backwards, and marked with a few distinct black points or spots; the sides are yellow, more or less clouded with black; and the underside is black, margined on each side with a straight yellowish line. Individuals are frequently found altogether of a lighter hue, and with the underside of the abdomen clear yellow; but the pattern above described on the upperside may be easily traced, being defined by black spots and markings on a yellow ground; in these examples the palpi are also yellow, the radial and digital joints alone deepening to dusky black.

The females generally resemble the males; but the central cephalothoracic band is often dilated behind the ocular area, and constricted at the occiput, the anterior dilatation being more or less extensively marked with yellow brown; the normal macula and succeeding chevrons on the abdomen also often form a broad dentate yellow band narrowing to the spinners; and marked with a series of pairs of black points or spots; in this sex the legs also are far more strongly and distinctly annulated with brown.

Adults of both sexes were common near Alexandria.

Lycosa observans, sp. n.

The adult male of this Spider is 2 lines in length.

It is very closely allied indeed to *L. inopina*, and is found in the same locality and situation; but it is rather smaller, and its colours are in general far less distinct, and run more one into the other, the pattern formed by their distribution being similar; the cephalothorax has no lateral yellow bands visible in either sex; and the posterior half (sometimes more) of the femora of the first pair of legs is black, the corresponding part of the second pair being also suffused with the same hue. The palpi are black, the radial and digital joints densely clothed with hairs; the palpal organs are somewhat similar; but the characteristic process is far less strong, its basal spur being of equal length with the process itself, obtuse, and forming with the process a more acute angle than in *L. inopina*.

It is possible that this Spider may be the *L. proxima*, Koch, though I am inclined to think it is of a distinct species. In some adult male examples the legs are entirely yellow, without any dark markings or annulations whatever; in general, however, they are more or less distinctly annulated with dusky brown or brown-black, especially in the females.

Adults of both sexes were found near Alexandria.

Fam. Sphasides.

Gen. Oxyopes, Latr.

Oxyopes alexandrinus.

Sphasus alexandrinus, Sav. et Aud. Egypte, p. 142, pl. iv. fig. 1.

Adult and immature examples of each sex were found near Cairo on branches of the sont acacia.

Oxyopes bilineatus, sp. n.

Length of an immature female, 2 lines.

Several very young examples of this species were found near Cairo, in a similar situation to that in which the last species was found. I feel no doubt that it is a distinct and probably undescribed species, though in the immature condition this is not absolutely certain, Spiders varying sometimes very considerably in the young state.

In general form and position of the eyes the present Spider is very similar to *O. alexandrinus.* The *abdomen* is of a yellow-brown colour, marked on the upperside with two very nearly parallel longitudinal pale yellowish lines rather wide apart, and comprising a broad brown elongate-oval band running the whole length of the abdomen. The sides are entirely devoid of the oblique pale lines so characteristic in *O. alexandrinus*; nor are there any angular lines, or chevrons, on the hinder half of the upperside of the abdomen.

The *cephalothorax* is yellow, with three broad longitudinal brown bands.

Fam. Salticides.

In recording and describing the species of this family found by myself in Egypt, I have not attempted to place them in any systematic consecutive order: the known species are placed first; and they are followed in each genus by the species considered to be new to science. Few families of the Araneidea need a thorough revision so much as the Salticides, especially with respect to the exotic genera. The number of described species of the family is now so great (upwards of one thousand) that their certain subdivision into well marked genera becomes each year a more pressing necessity. M. Eugène Simon has worked hard and successfully at the European forms of this family; and I am mainly indebted to him for the determination of those found in Egypt.

Gen. Ballus, Thor.

Ballus piger, sp. n.

Adult female, length 2 lines.

This Spider is very nearly allied to *Ballus heterophthalmus*, Koch (*Marpissa brevipes*, Koch, *Salticus obscurus*, Bl.), which it closely resembles in form, size, colour, and markings; and it may be distinguished by the legs of the first pair being like the rest, but slightly striped with brown; whereas in *B. obscurus*, they are almost wholly (at least the femoral, genual, and tibial joints) deep chocolate-brown; the humeral and cubital joints also of the palpi are of the same hue, whereas in the present Spider the palpi have scarcely any dark markings. Although these differences appear at first sight but slight ones by which to distinguish the species, I feel convinced that they will be found to be constant; I have examined numerous examples of the European form, and find no variation whatever in the markings of the legs and palpi; and I should be confident that some day the adult male and other examples of the female will further prove their distinctness from *S. obscurus*.

A single example only of the adult female was found in Upper Egypt.

Gen. ATTUS, Sim. (*Salticus*, Latr. ad partem).

ATTUS DELECTUS. (Plate LX. fig. 88.)

Attus delectus, Cambr. Spid. Pal. & Syr., P. Z. S. 1872, p. 326.

Adults of both sexes of this pretty and distinctly marked Spider were found near Alexandria.

ATTUS MOUFFETTII.

Salticus mouffettii, Sav. et Aud. Egypte, p. 171, pl. vii. fig. 17.

An adult female of this well marked Spider was found near Alexandria.

ATTUS STAINTONII.

Salticus staintonii, Cambr. Spid. Pal. & Syr., P. Z. S. 1872, p. 331, pl. xiv. fig. 20.

Salticus congener, Cambr. loc. cit. p. 332.

Adults of both sexes of this exceedingly distinct Spider were found in Upper Egypt, and are undoubtedly identical with those described *l. c. supra*. I have, moreover, now no hesitation in determining *S. congener* (*l. c. supra*) to be the female of *S.* (*Attus*) *staintonii*, although differing from it so considerably in colour and markings.

ATTUS SPINIGER. (Plate LX. fig. 103.)

Salticus spiniger, Cambr. Spid. Pal. & Syr., P. Z. S. 1872, p. 339.

Both sexes, adult as well as immature, were found on the trunks of palm-trees at various places in Egypt, between Cairo and Assouan. The very long, circularly coiled, filiform spine, connected with the palpal organs of the male, forms a very striking and distinguishing character, and renders the present Spider an easy one to be determined.

ATTUS PAYKULLII.

Salticus paykullii, Sav. et Aud. Egypte, p. 172, pl. vii. fig. 22.

S. vaillantii, Luc. Explor. de l'Algér. Arachn. p. 136, pl. v. fig. 2.

The identity of the two Spiders mentioned in the above synonyms appears to be undoubted. Adult and immature examples of both sexes were found near Cairo and Alexandria, generally on old walls. I have received lately adults of both sexes from the Mauritius, from Edward Newton, Esq., and also from Bombay, from Major Julian Hobson (H.M. Staff Corps).

ATTUS SOLDANII.

Salticus soldanii, Sav. et Aud. Egypte, p. 181, pl. vii. fig. 17, 18.

An adult male and several female and immature adults were found near Alexandria.

ATTUS MONARDI.

Salticus monardi, Luc. Explor. de l'Algér. p. 156, pl. vii. fig. 1.

An adult male of this distinct and pretty species was found near Cairo.

ATTUS FULGENS.

Salticus fulgens, Cambr. Spid. Pal. & Syr., P. Z. S. 1872, p. 340, pl. xiv. fig. 17.

Adults of both sexes were not unfrequent on trees and plants, near Alexandria, Cairo, and in Upper Egypt. This is one of the most brilliant and pretty of all the Salticides I found in Egypt; and its golden green iridescent abdomen distinctly spotted with white renders it an easily determined species.

ATTUS REGILLUS. (Plate LX. fig. 17.)

Attus regillus, L. Koch, Verhand. zool.-bot. Ges. Wien, p. 879.

Adult and immature males with immature females were found near Cairo and in Upper Egypt on trees and low shrubs, and subsequently in similar situations near Smyrna and Ephesus. I have also received it from Bombay. I include this Spider in the genus *Attus* on M. Simon's authority; but I conceive that the peculiar, almost circular form of the cephalothorax entitles it to generic separation from the typical *Atti.* A similar form of cephalothorax is not unfrequent in several other (as yet undescribed) exotic species.

ATTUS BONNETII.

Attus bonnetii, Sav. et Aud. Egypte, pl. vii. fig. 14 (♀).
Attus canescens, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 323.

Adults of both sexes of this species were found near Alexandria, and also at the roots and among the stems of stunted plants on the desert near Jebel y Silsilis, in Upper Egypt.

Savigny and Audouin describe and figure only the female; the male (length 2¼ lines) differs in the abdomen wanting the double longitudinal nearly parallel series of short oblique pale streaks on the upperside; instead of these there is a broad longitudinal central dark blackish-brown band, which sometimes emits a few very short oblique streaks on each side near its hinder extremity. The rest of the upper part and sides are thickly clothed with greyish hairs; though occasionally the sides have a broad longitudinal rusty or brownish band, marked with one or more indistinct oblique pale lines.

The *clypeus* of the male is, in general, densely clothed with white hairs, though in some examples these hairs are rusty red; the lateral margins also of the cephalothorax have a broad band of white hairs; and the upperside has two indistinct longitudinal bands of a similar nature.

The *legs* are sometimes yellow, without any markings; but in some specimens they are faintly annulated and marked with brown.

The *palpi* are short and similar to the legs in colour; the cubital and radial joints are very short; the latter is the shortest, and has, at the extremity of its outer side beneath, a strong slightly curved, prominent, tapering and sharp-pointed reddish-brown apophysis; from its position this apophysis is not easily seen without considerable care in examination; its length is equal to, if it does not exceed, the length of the joint. The palpi are clothed with long white bristly hairs; the digital joint is of good size, longer than the radial and cubital joints together; it is of a somewhat oblong-oval form, constricted on its outer side towards the fore extremity, where it has a somewhat truncated appearance. The palpal organs appear to be simple in form, and are of a dark reddish-brown colour.

This Spider is evidently subject to considerable variety in colours and distinctness of markings. A variety of the female, described in "Spid. Palest. & Syr." *l. c. supra* as *Salticus canescens*, Koch, has the longitudinal central band on the abdomen of a rusty red hue, but similar in its form and character to that of the male. An example of this variety, resembling exactly the Palestine specimen, was found along with the rest in Upper Egypt. Probably the variation in markings depends chiefly on the hairy clothing being more or less uninjured; when colours are dependent on pubescence, these will vary very much according to the length of time since the Spider became adult and has been exposed to the brilliant rays of the sun on a barren desert.

ATTUS OCULATUS, sp. n. (Plate LX. fig. 90.)

Adult male, length 2 lines.

The *cephalothorax* is massive, the hinder slope abrupt and slightly hollow in the profile line; the profile of the upper part of the caput forms a slightly curved line; and the fore part of the ocular region is rather prominent; its colour is yellow brown, the ocular area strongly tinged with orange, and the margins black; the surface is pretty thickly clothed with a depressed yellowish grey pubescence and whitish squamose hairs; the clypeus and the lateral margins (as well as the base of the falces in front) being more densely and regularly clothed with pure white hairs of the same nature.

The *eyes* are on black tuberculate spots, in the ordinary position;

the ocular area is broader than long, the line formed by the two posterior eyes being considerably longer than that formed by the four anterior ones; the fore centrals are of a dull mother-of-pearl colour, unusually large, but not quite contiguous to each other, and each is also very near but not quite contiguous to the lateral of the same row on its side. The minute eyes of the middle row are rather nearer to the posterior than to the anterior row, and each is placed within the straight line formed by the lateral eyes of those two rows respectively.

The *legs* are rather unequal in length; those of the first pair (in the male) are the longest and strongest; the femora, genua, and tibiæ of this pair are of a bright yellow-brown, the metatarsi considerably darker, and the tarsi pale yellow, the tibiæ and metatarsi being fringed above and below with strong prominent hairs; the legs of the third pair are, in the males, next in length (in the females they are rather longer than those of the first pair), those of the second pair being a little shorter than those of the fourth; these three pairs are yellow, slightly marked with dusky brown, but not regularly annulated; all are furnished with spines, those beneath the tibiæ and metatarsi of the first pair being the longest and strongest.

The *palpi* are short, and yellow in colour, the radial and digital joints bright yellow-brown; they are furnished thickly with hairs, chiefly white, and some of them, especially on the cubital, radial, and digital joints long and strong; the radial is rather shorter than the cubital, and has its extremity on the outer side produced into a very slightly curved, tolerably strong, tapering, deep-reddish-yellow-brown apophysis, almost, if not quite, equal in length to the joint itself; the digital joint is oval, and as long if not rather longer than the radial and cubital joints together; the palpal organs are well-developed, but simple in structure, with a strong curved tapering corneous process or spine lying along their inner side.

The *falces* are small, of a deep blackish red-brown colour, and clothed with white squamose hairs near their base in front.

The *maxillæ* and *labium* are similar to the falces in colour, tipped with pale yellowish.

The *sternum* is yellow, oval, and clothed with coarse whitish hairs.

The *abdomen* is small, oval, blunt behind, truncate before, and clothed pretty thickly with hairs; its colour is sandy yellowish, marked above and on the sides with dark brown, but forming no very definite pattern; the markings on the upperside are joined to the lateral ones, and form somewhat oblique but irregular lines; a central dark marking along the middle of the fore half of the upperside is also occasionally traceable; the spinners are moderately long and prominent.

The female is larger than the male, and is of a generally paler hue; the fore central eyes are also of a dull opaque whitish porcelain hue.

Two adults of each sex were found at the roots and among the stems of scattered herbage on the desert near Gebel-y-Silsilis, in

Upper Egypt. It is a very active spider, and appears to be nearly allied to the *Attus frontalis* (Walck.) of Europe.

ATTUS MENDICUS, sp. n.

Adult male, length $2\frac{1}{2}$ lines; adult female, 4 lines.

The *cephalothorax* is of a deep brown-black colour, densely clothed with greyish and sandy-grey pubescence, and margined with long white hairs; the hairs on the ocular area are of a distinctly squamose character, and sometimes form alternate longitudinal stripes of a whitish and sandy brownish-red hue. The fore part of the ocular area is also furnished with a few long curved bristles and bristly hairs; and the clypeus equals in height the diameter of a fore central eye.

The *eyes* are in the usual position, and their colour is dull greenish mother-of-pearl; the ocular area is scarcely broader than long, but projects forward considerably, and the line formed by the two posterior eyes is equal to that formed by the four anterior ones; the lateral eyes of the anterior row are removed considerably backwards, so that, looked at from above and behind, the row is strongly curved, with the curve directed forwards; the interval between each lateral and the central eye nearest to it is very nearly, if not quite, equal to the diameter of the lateral; the minute eyes of the middle row are respectively halfway between the laterals of the posterior and anterior rows.

The *legs* are strong, moderately long, and of a yellowish colour, indistinctly annulated with brown, furnished with spines, and clothed with hair, chief among which is a more or less dense whitish pubescence; the tibiæ, tarsi, and metatarsi of the first pair are dark brown. The femora of the same pair are somewhat tumid on the outer sides, rather beneath the fore extremity, where they have also a conspicuous double fringe of dark bristly hairs; their relative length appears to be 4, 3, 1, 2; but the difference is not very great; beneath the terminal claws of each tarsus is a black scopula, or brush of hairs.

The *palpi* are yellow, thickly fringed above and on each side with long, curved, white, bristly hairs, among which are a few black bristles; the cubital and radial joints are very short, but of about equal length; and the latter does not appear to have any apophysis at its outer extremity. The digital joint is equal to the radial and cubital joints together, and of an oblong oval form, truncated at its fore extremity; it is of a deep brown colour, clothed with long whitish bristles and hairs. The palpal organs are very large, but of simple structure, and of a somewhat globularly oval form; they are nearly black in colour, and extend backwards and outwards beneath the radial joint.

The *falces* are small, directed backwards, and, from the prominence of the ocular area, placed far back beneath the fore part of the cephalothorax; they are of a dark yellow-brown colour, clothed with hairs.

The *abdomen* is of a broadish oval form, dark black-brown, but densely and uniformly clothed with whitish and sandy grey pubescence, liable to be rubbed off in capturing and securing.

The female is considerably larger than the male, but resembles it in general characters and appearance; the colour of the abdomen in this sex, however, is more commonly of a more sandy hue than that of the male.

Adults of both sexes were found on the bare desert in several places from Alexandria to Assouan, and, except when in motion, are exceedingly difficult to perceive. The males are very active.

ATTUS MENDAX, sp. n.

Adult male, length 3 lines.

The *cephalothorax* of this Spider is massive, but of ordinary form, and thickly pubescent, with a good many prominent bristly hairs scattered over its upper surface, but most thickly on the fore part of the ocular area. It is of a deep black-brown hue, and has two parallel longitudinal stripes clothed with white hairs; these stripes run to the eyes of the hinder row, and melt away insensibly into the somewhat greyish rusty-yellow colour of the ocular area; the black-brown band between them is rather more than double their width, but narrows a little at its hinder extremity: the margins of the cephalothorax are black; but there is a bordering of white hairs both above and below them.

The *eyes* are in the ordinary position; the ocular area is broader than long, and the length of the hinder row is less than that of the anterior one; the eyes of the intermediate row equally separate the posterior and anterior ones, and each is placed a little within the straight line formed by the laterals of these two rows on its side. The height of the clypeus equals the diameter of one of the fore central eyes; these are very near to each other, but not quite contiguous, and each is separated from the lateral eye of the same row on its side by no more than one third the diameter of the latter.

The *legs* are strong, but not very long, nor greatly different in length; relatively to each other they are 4, 3, 1, 2; their colour is a dull yellow, faintly marked with a dusky hue, but scarcely annulated; they are clothed with a little greyish pubescence, and furnished with spines, hairs, and bristles; each tarsus terminates with two rather long claws, pectinated, and with a strong and compact scopula beneath them.

The *palpi* are short and strong; they are of a pale yellowish colour, the digital joints being slightly brownish yellow; the cubital joints are thickly fringed and clothed above with strong white hairs, among which, on the fore margin of the upperside of the joint, is a strong, prominent, black, tapering bristle; the radial joint is shorter than the cubital, and has a small, dark-coloured, slightly curved, and (apparently) blunt-pointed apophysis at its extremity on the outer side, just, or nearly, behind which is a rather compact tuft of straight black bristles; there are also some other bristles (both black and white) on other parts of the joint; the digital joint is large, considerably longer than the radial and cubital joints together, of an oblong-oval form, somewhat obliquely truncated at its fore extremity, and clothed with whitish hairs; the palpal organs are simple but large, and project backwards and rather outwards beneath, but free from, the radial joint, terminating in a somewhat conical point.

The *falces* are small, straight, nearly vertical, and of a yellow-brown colour, furnished with hairs and bristles.

The *abdomen* is oval, pointed behind, hairy, and of tolerable size; the upperside is brownish black, with a strong longitudinal central white or pale sandy grey stripe; this stripe is well defined on its edges, but is slightly broadest behind, and a very little notched or irregular on the edges in that part; the sides are slightly marked with brown, as also is the underside; but usually all markings on these parts are obscured by the thick grey or light sandy-grey pubescence; the spinners are prominent, black, tipped with white.

Three adult males were found in the neighbourhood of Cairo. It is nearly allied to *Attus fasciatus*, Hahn, but (the male, at least, the female being yet unknown) may be distinguished by its stronger and more robust form, and the distinctness of the white stripes on the cephalothorax and abdomen. It is also nearly allied to a species* abundant in the neighbourhood of Jerusalem and Jericho, and recorded (Spid. Palest. and Syria, P. Z. S. 1872, p. 322) as *A. fasciatus*, Hahn, with which species M. Simon considered it to be identical.

Having more recently found undoubted examples, in the south of England, of the true *A. fasciatus*, Hahn, the Palestine examples are proved to be quite distinct, being not only very much larger, but differing decidedly in colours and in the structure of the palpi.

ATTUS EFFIGIES, sp. n.

Immature male, length 2¾ lines.

Although almost denuded of hairs and pubescence, I am induced to describe this Spider as new to science, since it presents a very distinct pattern, and exhibits a strong likeness to a well-known European form *Yllenus, V.-insignitus*, Clk., from which, however, I think it is probably quite distinct.

The *cephalothorax* is dark yellow-brown, with two longitudinal yellow bands running backwards from each eye of the posterior row; these bands are partly clothed with white hairs, and probably are entirely and very distinctly so in uninjured specimens; the ocular area is dark brown, clothed with a greyish pubescence, showing some converging lines on its fore part, somewhat resembling those lines which form the Λ-shaped mark in *Yllenus V.-insignitus*,

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* To this Spider I now give the name of *Attus interceptor*. It may be distinguished from *A. mendax* (described above) by its larger size, and dark-brown sides, forming, in fact, three longitudinal grey stripes on the abdomen; the radial and hinder part of the digital joints of the palpi are also black-brown, offering a strong contrast to the white hairs with which the cubital joint is clothed; the legs, too, of the male differ in being dark red-brown and black, the tarsal joint yellow-brown, and the scopula of a sandy-greyish hue.

Clk.; the height of the clypeus equals, or nearly so, the diameter of one of the fore central eyes. The ocular area is broader than long; but the length of the posterior and anterior rows of eyes is equal; the eyes of the intermediate row are rather nearer to the posterior than to the anterior row.

The legs are short and strong; their relative length appears to be 4, 3, 1, 2; they are banded alternately, though not very distinctly, with yellow and yellow-brown; they are armed with spines (but most of the hairy clothing was absent); and each tarsus has a black scopula beneath the terminal claws.

The *palpi* (in an undeveloped state) are yellow, the digital joint being of large size.

The *abdomen* is black-brown on the upperside; a dark oblong marking along the centre of the fore half is followed to the spinners by a series of short, pale, angular bars, or chevrons, running one into the other and forming a dentated band; it is probable that this band is clothed with white hairs in uninjured examples; the sides are brown, marked with one or two oblique pale stripes; and the underside is pale luteous, spotted thinly with small black-brown spots, which concentrate and form an undefined band along the middle. The spinners are prominent, of a dark-brown colour, tipped with dull yellowish white.

A single example was found near Alexandria.

ATTUS MEMORIALIS, sp. n.

Adult female, length slightly over 2 lines.

The *cephalothorax* of this Spider is of ordinary form; in the two female examples found it was wholly (probably accidentally) denuded of hairy clothing; its colour is dark yellow-brown, with two longitudinal, pretty-well defined, dull orange-yellow stripes reaching from the hinder extremity (where they converge a little) to the ocular area, which is jet-black; the fore part of this area is prominent, and the clypeus (whose height is less than half the diameter of one of the fore central eyes) retreats; besides the two longitudinal stripes, there is a broad marginal one of the same hue on each side.

The *eyes* are in the usual position; the ocular area is broader than long, its posterior side being a very little shorter than the anterior; the eyes of the intermediate row are a little closer to the lateral eye of the posterior than to that of the anterior row on either side, but are in the same straight line with them; the eyes of the anterior row are bordered with white cilia; and probably the yellow stripes on the cephalothorax are usually clothed with white or grey or yellowish hairs, the remaining portions with dark brown ones; but, in the absence of an uninjured specimen, this is uncertain.

The *legs* are moderately strong, and not very long; their relative length appears to be 4, 1, 3, 2, the difference, if any, between those of the first and third pairs being very slight; the colour is yellow, without any markings or annulation: all the ordinary hairs and bristles were wanting (probably rubbed off by accident); but some strongish spines remained. The tarsal claws of the first and second pairs have a single small tooth near their middle part underneath; on the other legs the claws were absent, probably broken off by accident.

The *falces* are short, rather strong, directed backwards, and of a brownish orange-yellow colour.

The *abdomen* is oval; its colour is pale yellow, with two broad, brown, nearly parallel, longitudinal, well-defined bands down the centre of the upperside, and a less well-defined marginal stripe of the same colour on each side; taking the brown portions to be the ground-colour, there are thus three strong longitudinal yellowish stripes on the upperside—a straight one along the centre, and a curved one on each side; the underside has no markings, being of a uniform pale yellow; besides darker ones, the whole abdomen is thinly clothed with greyish hairs.

The adult male (length $1\frac{2}{3}$ line) resembles the female in colours and markings; the yellow stripes on the upperside of the cephalothorax are clothed with white hairs; and the ocular area has the remains of a yellowish-grey pubescence. The *palpi* are short, their colour is a dull brownish yellow, and they are furnished with white and black hairs and bristles; the cubital joint has a group of black bristles near its extremity on the inner side; the radial joint is rather shorter than the cubital, and furnished thickly with dark bristly hairs on the inner side; the whole of the outer side is a little produced, and apparently terminates with two small, blunt-pointed apophyses, forming a small fork-like extremity (the hinder apophysis being the least strong, and of a dark brown colour); the digital joint is large, of an oval form, considerably exceeding in length that of the radial and cubital joints together; its colour is yellow-brown, clothed with blackish bristly hairs, and tipped with grey ones; the palpal organs are large, and consist of a nearly globular pale brownish-yellow corneous bulb, which extends backwards beneath the radial joint. The tarsal claws of the fourth pair of legs are very slender, and have several fine pectinations near and beneath the fore extremity; I was unable to observe those of the first and second pairs; beneath the terminal claws in both sexes is a small dark scopula. The central yellow abdominal stripe in the male is much broader than the lateral ones, and has some very fine yellow points, issuing obliquely on each side, near its hinder extremity. These points represent the terminations of the ordinary angular bars, or chevrons, here obsolete.

An adult male, and two adult females were found in Upper Egypt. It is a very distinct species, though allied to *Attus lineatus*, Koch, and *A. bresnieri*, Luc.

ATTUS MEMORABILIS, sp. n. (Plate LX. fig. 110.)

Adult male length 3 to $4\frac{1}{4}$ lines.

Cephalothorax nearly double as long as broad, and of a flattened form; its colour is yellow-brown, and of a much deeper hue on the hinder slope than on the sides, with a black margin slightly fringed with white hairs; ocular area black, thinly furnished with fine shiny yellowish-grey hairs; the hinder part has several short oblique stripes of white hairs; and besides other hairs and slender bristles, there are one or two small tufts of stronger black bristles on either side of the ocular area just below the extremities of the anterior and intermediate rows of eyes, looking (when perfect) like horns; there is also a patch of white hairs close behind each eye of the posterior row; and one example also had a similar patch close behind the fore central eye. Clypeus almost obsolete.

The *eyes* are in the usual position; the ocular area is broader than long, and the length of the posterior row of eyes is slightly greater than that of the anterior one. The eyes of the intermediate row are rather nearer to the posterior than to the anterior lateral eyes.

The *legs* are moderately long and not very strong, except those of the first pair; these are long and of inordinate strength, especially the femoral joints; those of the fourth pair are longer than those of the second, and the third pair are rather the shortest; the first pair are of a dark reddish yellow-brown colour, armed with a double row of not very strong spines beneath the tibiæ and metatarsi, and furnished thickly, and chiefly underneath, with fine prominent hairs; the tarsi are paler-coloured than the rest, and (like those of the other pairs) have a small compact black scopula beneath their terminal claws; the other three pairs are of a brownish yellow (the femora strongly suffused with dark smoky brown) and furnished with hairs and fine spines.

The *palpi* are rather short and slender; they are of a dark reddish yellow-brown colour, furnished with hairs, many of which are nearly white; the radial joint is exceedingly short, shorter than the cubital, and its outer extremity terminates with a small curved, deep black-brown, pointed apophysis; the digital joint is oblong oval, and exceeds in length that of the cubital and radial joints together; its colour is deep brown, it is clothed with dark hairs, and at its extremity (which is rather of a truncate form) there are some short dull sandy-coloured ones; the palpal organs are simple in form, and extend a little backwards beneath the radial joint.

The *falces* are tolerably long and strong; they are also divergent and projecting forwards, and are armed with a strong tooth on their inner sides.

The *maxillæ* and *labium* are reddish yellow-brown, the latter being the darkest; and the *sternum* is small, oval, of a dull yellow colour, dark brown in front and on the margins.

The *abdomen* is of a long narrow oblong oval form, nearly half as long again as the cephalothorax, and not much more than half its width; the upperside is clothed with hairs, many of which are of a shining, rather golden-green hue, scintillating in different lights; it is of a dark brown colour, with a somewhat paler longitudinal central band, from which three well-marked though irregularly defined oblique yellowish stripes, clothed with white hairs, issue on either side; there are also two others of a similar nature on the fore margin, forming a curved anterior marginal border; the sides are closely striated, in a longitudinal direction with brown; and the underside is dull pale yellow, marked with a longitudinal central dark brown stripe, on each side of which, towards the margins, is a finer line of the same colour; these lines converge towards the spinners, which are rather long and prominent; those of the superior pair are pale yellow, black on the uppersides, the inferior pair being of a brighter yellow.

The adult female measures about 4½ lines in length, but differs very greatly in colours and markings from the male, though in general structure and form the sexes are much more nearly alike. The female has the sides of the cephalothorax yellow, deepening to a dark striated brown above, the caput black, clothed with fine pale hairs, and some long white ones on the clypeus; the two horn-like tufts of black bristles below and behind the lateral eyes of the anterior row are generally better defined than in the male.

The *legs* are yellow; those of the first pair tinged with orange-brown; these last are much the strongest, though not so disproportionately strong as in the male; they are scarcely longer, if so long as those of the fourth pair, the second pair being perhaps a little the shortest. The palpi are short, slender, yellow, semiannulated with black.

The *abdomen* is much longer in proportion than that of the male, being considerably more than double the length of the cephalothorax; its general colour is pale yellow, the upperside dark blackish brown, with a broadish, longitudinal, pale-yellowish, central, slightly dentated band, spotted sparingly with small black spots, and bisected longitudinally by a black line; the sides are very sparingly marked with brown; and the underside has seldom more than a fragment or two of the brown stripe and lines on that of the male.

Adult males, together with an adult and immature females, were found among rushes and herbage in a marsh near Alexandria. It is a very striking-looking Spider, allied to *Attus staintonii*, Cambr., and belongs to a group which has, as yet, no known representatives in Europe. From various points in its form and structure, it seems entitled to rank as generically distinct from the typical *Atti*; it appears indeed very similar in form to some species of the exotic genus *Mævia*, C. Koch; but at present, not possessing any type of *Mævia*, I am not able to determine whether or not it is identical in form and structure with the typical species of that genus.

Gen. YLLENUS, Thor.

YLLENUS SALIENS, sp. n. (Plate LX. fig. 92.)

Adult male, length 1½ line; adult female, 1¾ to 2 lines.

This minute but pretty little Spider is in general colours and markings very much like *Attus bonnetii*, Sav. (described above p. 611); it is, however, much smaller and generally of a brighter colour; the legs differ in length; and the palpi and palpal organs are very different in their form and structure.

The *cephalothorax* of the male, which is very massive, is of an orange-yellow-brown colour; the ocular area is thickly clothed with whitish or yellowish grey squamose adpressed hairs. The thoracic region has two longitudinal bands of white hairs, running backward from the eyes of the posterior row; these bands are often coalescent with other whitish hairs on the sides and hinder slope and those on the ocular area; in some examples a marginal band of white hairs is traceable; some examples have the sides and hinder slope clothed with reddish yellow hairs, and in these the white stripes show very distinctly; the clypeus, which is less in height than half the diameter of the fore central eyes, is clothed with pale dull scarlet (or perhaps, more correctly speaking, brick-red) hairs. The ocular area is broader than long, the hinder row being a little longer than the foremost one.

The *legs* are strong and moderately long; their relative length is 4, 1, 2, 3, those of the fourth pair, especially the femoral joints, being considerably the longest; their colour is yellow, furnished with hairs, bristles, and spines, the hairs being chiefly of a whitish hue, and the scopula beneath the tarsal claws blackish.

The *palpi* are short and resemble the legs in colour, and are pretty thickly furnished with long bristly white hairs; the radial joint is very short, shorter than the cubital, and has a blunt pointed yellow-brown apophysis at its outer extremity, tipped with black; the digital joint is long and of a narrow oblong oval form, clothed at the tip with black hairs; the palpal organs are large and of a somewhat globular form, they extend backwards beneath the radial joint, and are of a dark yellow-brown colour.

The *falces* are small and of a deep yellow-brown colour.

The *maxillæ*, *labium*, and *sternum* are yellow, clothed thinly with coarse grey hairs.

The *abdomen* is small, oval, and hairy; its colour is yellow; and it has a broad longitudinal central band, on its upperside, of an orange yellow-brown colour, often of a deep red-brown on the fore half, and showing traces of the normal curved or angular bars, or chevrons, of a dark yellow-brown colour on the hinder half; the sides have a longitudinal ill-defined orange-brown band, in some examples represented by a few short oblique stripes of that colour; the underside is of a pale straw yellow without any markings.

The *female* has the legs and palpi sometimes slightly annulated with dark brown, and the central abdominal stripe sometimes of a dark brown colour, and more dentated on the edges of the hinder part than in the male; in other respects the sexes are very much alike.

Adults of both sexes were found among the stems and at the roots of scattered stunted plants on the desert near Jebel y Silsilis. It is an exceedingly active Spider, the length of its leaps being remarkable, its long hind legs giving it no doubt great powers of jumping. Although so nearly resembling *Attus bonnetii* in colours and markings, the length of its hind legs will distinguish it readily. It is probably a common Spider, inasmuch as the seven examples I found were all at the base of one tuft of herbage.

Gen. PLEXIPPUS, Koch.

PLEXIPPUS ADANSONII.

Attus adansonii, Sav. et Aud. Egypte, p. 169, pl. vii. fig. 8.

Attus tardigradus, id. ibid. p. 170, pl. vii. fig. 13.

Attus oraniensis, Luc. Explor. Algér. p. 144, pl. v. fig. 8.

Attus nigrofuscus, Vins. Aran. des îles de la Réunion, Maurice et Madagascar, 1863, p. 59 et 302, pl. x. fig. 8.

Three adult males and an adult female were found at Cairo.

I feel no hesitation in determining the *Attus nigrofuscus*, Vinson, to be of this species. Savigny and Lucas figured only the males, while Vinson describes and figures the female alone. Numerous examples of both sexes received from Bombay and Ceylon agree exactly with the examples found both in Egypt and Palestine; nor can I find any difference in examples lately received from Edward Newton, Esq., from the Mauritius.

Gen. MENEMERUS, Sim.

MENEMERUS VIGORATUS.

Euophrys vigoratus, Koch, Die Arachn. xiv. p. 14, figs. 1282, 1283.

A single example of the female (immature), determined by M. Simon to be of this species, was found near Cairo.

MENEMERUS HEYDENII.

Menemerus heydenii, Sim. Monogr. des Att. d'Europe, Ann. Soc. Ent. Fr. 1868, 4^{e} sér. viii. p. 665.

Adult and immature examples of both sexes were found not unfrequently upon the trunks of palm trees near Cairo and in Upper Egypt.

MENEMERUS ANIMATUS, sp. n. (Plate LX. fig. 89.)

Adult male, length 2½ lines.

The *cephalothorax* is of a rather flattened form; its colour is dark-brown, with a broad yellowish marginal band, a large, somewhat subtriangular patch on the thorax (continued down the hinder slope in a narrow band) of the same colour, and a small spot behind each posterior eye, densely clothed with white depressed hairs, with which also the ocular area and the clypeus are more or less clothed; brown and golden-yellowish hairs are also often intermixed with the others on the ocular area.

The *eyes* are in the ordinary position; the ocular area appears to be about equal in length and breadth; the length, however, of the anterior row exceeds slightly that of the posterior one; and the eyes of the intermediate row are rather nearer to the posterior than to the anterior one.

The *legs* are moderate in length and strength; they do not differ greatly in their length, which appears to be relatively 4, 1, 3, 2; their colour is yellow; and they are furnished sparingly with hairs, slender bristles, and spines, each tarsus terminating with a small dark-coloured scopula beneath the tarsal claws.

The *falces* are of moderate size and strength, and are placed rather far back, owing to the projection of the ocular area; they are slightly divergent, and project a little from a vertical position; their colour is a deep rich red-brown; and their surface is marked with numerous transverse ingrained striations.

The *palpi* are of moderate length; and their colour is yellow, the radial joints yellow-brown; the humeral joint is very strong and tumid underneath, with a strong, pointed, tooth-like spur or prominence near its base on the outer side; this joint is thickly clothed with coarse white hairs: the radial joint is shorter than the cubital, but is produced laterally on each side, and has a pointed apophysis at its extremity underneath; the digital joint is large, and of an elongate oval form and dark red-brown colour, clothed with dark hairs, a few at the anterior extremity being of a paler hue. The palpal organs are not complex, but highly developed and prominent, extending far backwards beneath, and on the inner side of, the radial joint.

The *maxillæ* and *labium* are blackish-brown, tipped with pale yellow.

The *sternum* is oval, and of a yellow colour.

The *abdomen* is oval, of a somewhat flattened form, and sparingly clothed with hairs; its colour is yellow, marked, but not strongly, on the upperside with yellow-brown, giving some faint indications of an irregular longitudinal central yellowish band (along the fore half of which is a dark marking), and some short, oblique, slightly curved lateral stripes issuing from its hinder half; the lateral margins also of the upperside are irregular, being in some examples marked with short alternate yellowish and yellow-brown oblique markings.

The female resembles the male in colours and markings, though those of the cephalothorax are less strong and distinct than in that sex.

Adults of both sexes were found on rocks and walls in Upper Egypt, and three immature examples near Alexandria.

MENEMERUS INTEREMPTOR, sp. n.

Adult female, length 4 lines.

This Spider is nearly allied to *M. animatus*, but is considerably larger, and though resembling it in its general hue, is even less distinct in its markings.

The *cephalothorax* is dark yellow-brown, darkest on the caput, and with an indistinct yellowish marginal band; the whole surface is clothed, but not very densely, with yellowish-grey, mixed with a somewhat golden pubescence. The ocular area is broader than long; and the length of the hinder row of eyes is a little greater than that of the anterior row.

The *legs* are moderately strong, and not very long; their relative length appears to be 4, 1, 3, 2, though the difference, if any, between 4 and 1, and 3 and 2, respectively, is very slight; those of the first two pairs are yellow-brown, the third and fourth being yellow; all are furnished, but not very conspicuously, with hairs, slender bristles, and spines; the tarsi are furnished at their extremities with a small black scopula beneath the tarsal claws, which have only a single, scarcely visible denticulation near the middle of their underside.

The *palpi* are slender, of moderate length, and fringed thickly on each side with coarse white hairs.

The *falces* are deep reddish black-brown, the *maxillæ* and *labium* being dark yellow-brown, tipped with yellowish-white, and the *sternum* dull orange-yellow.

The *abdomen* is yellow, slightly suffused with yellow-brown on the upperside, which has an indistinct and rather irregular marginal brownish line, enclosing nearly its whole area, the enclosed space being narrower behind than before, and containing a longitudinal central tapering band, very faintly defined by two lines of a slightly paler hue than the rest; the sides are marked with a few faint, brownish, horizontal lines or short stripes; the underside is yellow, immaculate, the spinners short and of a yellow-brown colour; the genital aperture is of a transverse oval form, and connected with a rather large dark yellow-brown somewhat quadrate area.

Several adult and immature females, with an immature male, were found near Cairo.

Gen. EPIBLEMUM, Hentz (*Calliethera*, C. Koch).

EPIBLEMUM TRICINCTUM.

Calliethera tricincta, C. Koch, Die Arachn. xiii. p. 50, pl. xliv. fig. 1117.

Two adult females of this species were found near Alexandria. It is very nearly allied to *E. scenicum*, Koch., but may easily be distinguished by the oblique lateral white stripes uniting and forming transverse bands across the abdomen.

EPIBLEMUM PALUDIVAGUM.

Salticus paludivagus, Luc. Explor. Algér. p. 167, pl. viii. fig. 7.

A single adult female (concluded by M. Simon to be of this species) was found near Alexandria.

Gen. HELIOPHANUS, C. Koch.

HELIOPHANUS DECORATUS.

Salticus cupreus, Sav. et Aud. Egypte, p. 171, pl. vii. fig. 15.

Heliophanus decoratus, L. Koch, Ægyptische und abyss. Arachn. 1875, p. 87, pl. vii. fig. 8.

Adult examples of both sexes were found among plants on the walls of the fortifications near Alexandria.

There is no doubt about the distinctness of this Spider from *H. cupreus*, Walck. (Europe); and I feel confident that it is the same as that described and figured by Savigny and Audouin, and (lately) by Dr. L. Koch (*loc. cit. supra*). It is very nearly allied to, perhaps identical with, *H. facetus*, Cambr., found in Palestine.

Gen. Salticus, Sim. (Latr. ad part.).

Salticus todillus.

Salticus todillus, Sim. Monogr. Att. d'Europe, Ann. Soc. Ent. Fr. 4^e sér. 1868, tom. viii. p. 713, pl. iii. fig. 15; Cambr. Spid. Palest. and Syria, P. Z. S. 1872, p. 324, pl. xiv. fig. 19.

Examples of this very distinct and pretty little *Salticus* were found under stones near Alexandria.

Salticus repudiatus, sp. n.

Adult female, length 2 lines.

This Spider is nearly allied to, but quite distinct from *S. todillus*, Sim.

The *cephalothorax* is of a flattened oblong form, the fore extremity almost squarely truncated, and the hinder slope slight, and somewhat rounded in profile; it is of an orange-yellow brown colour, with two broad longitudinal dark brown bands running from the hinder extremity, through the posterior eyes, to the fore part of the ocular area, in the dark blackish-brown colouring of which they merge.

The *eyes* are in the ordinary position; the ocular area is longer than broad, and its fore part is very projecting; the eyes of the intermediate row are much nearer to the anterior than to the posterior row, and are placed within the straight line of the lateral eyes of those two rows.

The *legs* are moderately long, their relative length being 4, 1, 3, 2; those of the three posterior pairs are slender, and, except the metatarsi of the second pair, furnished with hairs only; the femora, genua, and tibiæ of the first pair are very much stronger than those of any of the rest, of a yellow-brown colour, the tibial joints much darker, and, with the metatarsi, armed beneath with two longitudinal parallel rows of four strong spines in each row; the legs of the second pair are yellow, the tibiæ marked on each side forwards with brown; those of the third and fourth pairs are yellow; all the tarsi have a small dark scopula beneath the terminal claws.

The *palpi* are moderately long, slender, and of a yellow colour.

The *falces* are small, vertical, yellow-brown, and placed far back beneath the fore part of the cephalothorax.

The *maxillæ* and *labium* are yellow-brown, the *sternum* yellow, and of a narrow oval form.

The *abdomen* is of an elongate oval form, constricted towards the fore part, and joined to the cephalothorax by a short but distinct pedicle; its colour is yellow-brown, paler in the region of the constriction and on the sides of the fore extremity; a small oblong patch at the fore extremity, as well as most of the hinder half, are shining and of a somewhat corneous appearance, the hinder extremity also deepening considerably in colour; the underside is much paler, with two faint longitudinal, parallel, dusky-brown bands.

A single example of the adult female was found under a stone near Alexandria.

List of Species above described and recorded.

Fam. FILISTATIDES.

Filistata testacea, Latr., p. 543.
—— *puta*, sp. n., p. 544.

Fam. ŒCOBIIDES.

Œcobius putus, sp. n., p. 544, Plate LVIII. fig. 1.
—— *templi*, sp. n., p. 545, Plate LVIII. fig. 2.
—— *annulipes*, Luc., p. 546.
Uroctea limbata, C. Koch, p. 546.

Fam. DYSDERIDES.

Ariadne insidiatrix, Sav., p. 547.
Dysdera lata, Reuss, p. 547.
Oonops scutatus, sp. n., p. 547, Plate LVIII. fig. 2 A.
—— *pauper*, sp. n., p. 549.

Fam. DRASSIDES.

Gnaphosa plumalis, Cambr., p. 550.
—— *conspersa*, id., p. 550.
—— *procera*, id., p. 550.
—— *marginata*, id., p. 551.
—— *venatrix*, id., p. 551.
Drassus mundulus, id., p. 551.
—— *senilis*, id., p. 551.
—— *infumatus*, id., p. 551.
—— *ornatus*, id., p. 551.
—— *campestratus*, id., p. 551.
—— *alexandrinus*, id., p. 551.
—— *ægyptius*, id., p. 552.
—— *vulpinus*, id., p. 552.
—— *denotatus*, id., p. 552.
—— *pugnax*, id., p. 552.
Prosthesima læta, Cambr., p. 552.
—— *picina*, id., p. 552.
—— *tristicula*, id., p. 552.
—— *curina*, id., p. 552.
—— *nilicola*, id., p. 552.
—— *mollis*, id. p. 553.
—— *pallida*, id., p. 553.
—— *inaurata*, id., p. 553.
Micaria cincta, L. Koch, p. 552.
Cheiracanthium dubium, id., p. 553.
—— *equestre*, id., p. 553.
—— *isiacum*, Cambr., p. 553.
—— *tenuissimum*, L. Koch, p. 553.
—— *annulipes*, id., p. 553.

Fam. PALPIMANIDES.

Palpimanus hæmatinus, C. Koch, p. 554.
—— *savignyi*, Sav., p. 554.

Fam. ERESIDES.

Eresus petagnæ, id., p. 554.
—— *dufourii*, id., p. 554.

Fam. DICTYNIDES.

Dictyna innocens, Cambr., p. 555.
—— *conducens*, sp. n., p. 556, Plate LVIII. fig. 3.
—— *condocta*, sp. n., p. 556, Plate LVIII. fig. 4.

Fam. AGELENIDES.

Titanœca distincta, Cambr., p. 557.
Agelena lepida, sp. n., p. 558.
Tegenaria proxima, Cambr., p. 559.
Textrix coarctata, Duf., p. 559.
Enyo nitida, Sav., p. 559.
—— *expers*, sp. n., p. 560.

Fam. HERSILIIDES.

Hersilia caudata, Sav. et Aud. (var. *diversa*, Cambr.), p. 560, Plate LVIII. fig. 6.
Hersilidia lucasii, sp. n., p. 562, Plate LVIII. fig. 5.

Fam. SCYTODIDES.

Loxosceles rufescens, Duf., p. 564.
Scytodes thoracica, Walck., p. 564.
—— *kochii*, sp. n., p. 564.

Fam. PHOLCIDES.

Pholcus semicaudatus, sp. n., p. 565.
—— *rivulatus*, Sav. et Aud., p. 566.

Fam. THERIDIIDES.

Latrodectus erebus, Sav. et Aud., p. 567.
Lithyphantes hamatus, Koch, p. 568.
Steatoda signata, sp. n., p. 568.
—— ? *mandibulare*, Luc., p. 568.
Euryopis acuminata, Luc., p. 569.
—— *scripta*, Cambr., p. 569.
—— *quadrimaculata*, sp. n., p. 569.
Theridion rufolineatum, Luc., p. 569.
—— *varians*, Koch, p. 570.
—— *spinitarsis*, sp. n., p. 570.
—— *melanostictum*, sp. n., p. 570.
Mimetus monticolus, Bl., p. 571.
Erigone spinosa, Cambr., p. 572.
—— *alexandrina*, id., p. 572.
Linyphia extricata, sp. n., p 572, Plate LIX. fig. 7.
Pachygnatha argyrostilba, sp. n., p. 573, Plate LIX. fig. 8.

Fam. EPEÏRIDES.

Tetragnatha molesta, Cambr., p. 574.
—— *nitens*, Sav., p. 574.
—— *flava*, id., p. 574.
—— *filiformis*, id., p. 575.
—— *pelusia*, id., p. 575.

Singa affinis, sp. n., p. 575.
—— *lucina*, Sav., p. 575.
Argiope aurelia, Sav., p. 576.
—— *sticticalis*, sp. n., p. 576.
Cyrtophora opuntiæ, Duf., p. 576.
Epeïra chloris, Sav., p. 576.
—— *suspicax*, sp. n., p. 577.
—— *perplicata*, Cambr., p. 577.
—— *circe*, Sav., p. 577.
—— *dromedaria*, Walck., p. 577.
—— *atomaria*, sp. n., p. 577, Plate LIX. fig. 9.

Fam. Uloborides.

Uloborus signatus, sp. n., p. 579.

Fam. Thomisides.

Thomisus lateralis, C. Koch, p. 580.
—— *spinifer*, Cambr., p. 580.
Diæa diana, Sav., p. 580.
—— *candicans*, sp. n., p. 580.
Xysticus hirtus, Sav., p. 581.
—— *promiscuus*, sp. n., p. 581.
—— *ferus*, sp. n., p. 583.
—— *peccans*, sp. n., p. 584.
—— *subclavatus*, sp. n., p. 584.
Selenops ægyptiaca, Sav., p. 585, Plate LIX. fig. 10.
Sparassus walckenaerius, Sav., p. 587.
—— *cognatus*, sp. n., p. 588.
—— *suavis*, sp. n., p. 588.
Artanes bigibba, sp. n., p. 590.
—— *lugens*, sp. n., p. 591.
Thanatus albini, Sav., p. 591.
—— *lineatipes*, sp. n., p. 591.
—— *flavus*, sp. n., p. 592.
—— *flavescens*, sp. n., p. 592.
Philodromus adjacens, sp. n., p. 592, Plate LIX. fig. 11.
—— *medius*, Cambr., p. 594.
—— *cinereus*, sp. n., p. 594.
—— *venustus*, sp. n., p. 595, Plate LIX. fig. 12.

Fam. Lycosides.

Nilus (gen. nov.) *curtus*, sp. n., p. 596, Plate LIX. fig. 13.
Pirata leopardus, Sund., p. 598.
—— *proxima*, sp. n., p. 598.
Trochosa partita, sp. n., p. 599.
—— *depuncta*, sp. n., p. 600.
—— *pilipes*, Luc., p. 600.
—— *virulenta*, sp. n., p. 600.
—— *urbana*, sp. n., p. 601, Plate LX. fig. 14.
Trochosa effera, Cambr., p. 601.
Tarentula tarentulina, Sav., p. 601.
—— *truculenta*, sp. n., p. 601.
—— *tremens*, sp. n., p. 602.
Lycosa ungulata, sp. n., p. 603.
—— *fidelis*, Cambr., p. 604.
—— *injucunda*, sp. n., p. 605, Plate LX. fig. 15.
—— *iniqua*, sp. n., p. 605.
—— *inquieta*, sp. n., p. 606.
—— *inopina*, sp. n., p. 607, Plate LX. fig. 16.
—— *observans*, sp. n., p. 608.

Fam. Sphasides.

Oxyopes alexandrinus, Sav., p. 609.
—— *bilineatus*, sp. n., p. 609.

Fam. Salticides.

Ballus piger, sp. n., p. 609.
Attus delectus, Cambr., p. 610, Plate LX. fig. 88.
—— *mouffettii*, Sav., p. 610.
—— *staintonii*, Cambr., p. 610.
—— *spiniger*, id., p. 610, Plate LX. fig. 103.
—— *paykullii*, Sav., p. 610.
—— *soldanii*, id., p. 611.
—— *monardi*, Luc., p. 611.
—— *fulgens*, Cambr., p. 611.
—— *regillus*, L. Koch, p. 611, Plate LX. fig. 17.
—— *bonnetii*, Sav., p. 611.
—— *oculatus*, sp. n., p. 612, Plate LX. fig. 90.
—— *mendicus*, sp. n., 614.
—— *mendax*, sp. n., p. 615.
—— *effigies*, sp. n., p. 616.
—— *memorialis*, sp. n., p. 617.
—— *memorabilis*, sp. n., p. 618, Plate LX. fig. 110.
Yllenus saliens, sp. n., p. 620, Plate LX. fig. 92.
Plexippus adansonii, Sav., p. 622.
Menemerus vigoratus, Koch, p. 622.
—— *heydenii*, Sim., p. 622.
—— *animatus*, sp. n., p. 622, Plat LX. fig. 89.
—— *interemptor*, sp. n., p. 623.
Epiblemum tricinctum, C. Koch, p. 624.
—— *paludivagum*, Luc., p. 624.
Heliophanus decoratus, L. Koch, p. 624.
Salticus todillus, Sim., p. 625.
—— *repudiatus*, sp. n., p. 625.

List of Egyptian Spiders not found by myself, but described and recorded by other Authors.

Fam. THERAPHOSIDES.

Nemesia cellicola, Sav. et Aud.
Chætopelma ægyptiaca, Dol.

Fam. DYSDERIDES.

Dysdera erythrina, Sav. et Aud. (probably not *D. erythrina*, Walck.).

Fam. ŒCOBIIDES.

Uroctea durandi, Duf.
—— *goudoti*, C. Koch.

Fam. DRASSIDES.

Gnaphosa lentiginosa, C. Koch.
—— *schaefferi*, Sav. et Aud.
—— *linnæi*, id.
Micaria albini, Sav. et Aud.
Drassus lyonettii, iid.
—— *listeri*, iid. (*Clubione*).
Prosthesima listeri, iid. (*Drassus*).

Fam. ERESIDES.

Eresus pharaonius, Walck.
—— *molitor*, C. Koch (genus *Stegodyphus*, Sim.).
—— *fuscifrons*, id.
—— *lituratus*, id.
—— *semicinctus*, id.

Fam. AGELENIDES.

Lachesis perversa, Sav. et Aud.
Arachne timida.
Tegenaria (?) *familiaris*, Sav. et Aud. (*Arachne*).
—— *pagana*, Koch (L. Koch, 'Ægypt. und abyss. Arachn.').

Fam. ENYOIDES.

Enyo longipes, Sav. et Aud.

Fam. SCYTODIDES.

Scytodes immaculata, L. Koch ('Ægypt. u. abyss. Arachn.').

Fam. PHOLCIDES.

Artema convexa, Bl. (*Pholc. borbonicus*, Vins., L. Koch, 'Ægypt. und abyss. Arachn.,' 1875, p. 25).

Fam. THERIDIIDES.

Theridion vagulans, L. Koch (*l. c. supra*).
—— *triangulosum*, Walck. (L. Koch, *l. c.*)
Latrodectus 13-*guttatus*, Rossi, = *L. argus*, Sav. et Aud.
—— *martius*, Sav. Walck. (i. p. 645) denies the fact of its being an Egyptian Spider; but M. Simon ("Aran. nouv. ou peu connus de l'Europe, 2e Mém.," Mém. Liége, 1873) states it to be so.
Lithyphantes venator, id. (*Latrodectus*).
—— *ephippiatus*, Thor.
Erigone vagans, Sav. et Aud.

Fam. EPEÏRIDES.

Argiope sericea, Oliv. (Sav. et Aud.).
—— *splendida*, Sav. et Aud.
Epeïra armida, Sav. et Aud.
—— *umbratica*, id. (nec *umbratica*, C. K.).

Fam. Thomisides.

Thomisus peronii, Sav. et Aud.
—— *martyni*, iid.
Misumena buffonii, iid. (*Thomisus*).
Diæa globosa, Fabr. (*Thomisus rotundatus*, Sav. et Aud.).
Xysticus lalandi, id. (*Thomisus*, Sav. et Aud.).
—— *clerckii*, id. (*Thomisus*, iid.).
Sparassus clerckii, id. (*Philodromus*, iid.).
—— *argelasius*, Latr. (*Phil. linnæi*, Sav. et Aud.).
Thanatus fabricii, Sav. et Aud. (*Philodromus*).
—— *rhombiferens*, iid. (*Philodromus*).

Fam. Lycosides.

Ocyale atalanta, Sav. et Aud.
Dolomedes hippomane, iid.
Trochosa pelliona, iid. (*Lycosa*).
—— *nilotica*, iid. (*Lycosa*).
—— *annulipes*, L. Koch ('Ægypt. u. abyss. Arachn.').
Lycosa arenaria, Sav. et Aud.
—— *peregrina*, iid.
—— *pelusiaca*, iid.
—— *serena*, L. Koch ('Ægypt. und abyss. Arachn.').

Fam. Salticides.

Attus frischii, Sav. et Aud. (*Salticus*).
—— *druryi*, iid. (*Salticus*).
—— *gesneri*, iid. (*Salticus*).
—— *hunteri*, iid. (*Salticus*).
—— *illigeri*, iid. (*Salticus*).
—— *redii*, iid. (*Salticus*).
Euophrys plebeja, L. Koch ('Ægypt. u. abyss. Arachn.').
Ælurops dorthesii, Sav. et Aud. (*Salticus*).

EXPLANATION OF THE PLATES.

Plate LVIII.

Fig. 1. *Œcobius putus*, sp. n., p. 544.
a, Spider, enlarged; *b*, eyes, from the front; *c*, right palpus, from inner side; *d*, natural length of Spider.

2. *Œcobius templi*, sp. n., p. 545.
a, Spider, enlarged; *b*, eyes, from the front; *c*, right palpus, from inner side; *d*, genital aperture (♀); *e*, natural length.

2 a. *Oonops scutatus*, sp. n., p. 547.
a, Spider, enlarged; *b*, underside, with legs truncated; *c*, profile, ditto; *d*, eyes, from the front; *e*, *f*, palpus in two positions; *g*, natural length.

3. *Dictyna conducens*, sp. n., p. 556.
a, Spider, enlarged; *b*, profile, without legs; *c*, cephalothorax and falces, from the front; *d*, *e*, palpus in two positions; *f*, genital aperture (♀); *g*, natural length.

4. *Dictyna condocta*, sp. n., p. 556.
a, Spider, enlarged; *b*, profile, without legs; *c*, cephalothorax and falces, from the front; *d*, *e*, left palpus in two positions; *f*, natural length.

6. *Hersilia caudata*, Sav. et Aud., p. 560.
a, Spider, enlarged; *b*, eyes and falces, from the front; *c*, natural length.

5. *Hersilidia lucasii*, sp. n., p. 562.
a, Spider, enlarged; *b*, eyes, from the front; *c*, *d*, left palpus in two positions; *e*, natural length.

PLATE LIX.

Fig. 7. *Linyphia extricata*, sp. n., p. 572.
a, Spider, enlarged; *b*, profile, without legs; *c*, right palpus, on outer side; *d*, genital aperture (♀); *e*, natural length.

8. *Pachygnatha argyrostilba*, sp. n., p. 573.
a, Spider, enlarged; *b*, eyes and falces, from the front; *c*, *d*, right palpus in two positions; *e*, natural length.

9. *Epeïra atomaria*, sp. n., p. 577.
a, Spider, enlarged; *b*, profile, ditto; *c*, abdomen, ditto; *d*, *e*, palpus in two positions; *f*, natural length.

10. *Selenops ægyptiaca*, Sav. et Aud., p. 585.
a, Spider, natural size; *b*, profile, enlarged, without legs; *c*, eyes and falces, from the front; *d*, *e*, palpus in two positions.

11. *Philodromus adjacens*, sp. n., p. 592.
a, Spider, enlarged; *b*, eyes and falces, from the front; *c*, *d*, right palpus in two positions; *e*, genital aperture (♀); *f*, natural length.

12. *Philodromus venustus*, sp. n., p. 595.
a, Spider, enlarged; *b*, eyes, from the front; *c*, genital aperture; *d*, natural length.

PLATE LX.

13. Gen. nov. *Nilus curtus*, sp. n., p. 596.
a, Spider, enlarged; *b*, eyes, from the front; *c*, maxillæ and labium; *d*, terminal claws at extremity of tarsus; *e*, natural length.

14. *Trochosa urbana*, sp. n., p. 601.
a, Spider, enlarged; *b*, *c*, palpus in two positions; *d*, genital aperture (♀); *e*, natural length (♂).

15. *Lycosa injucunda*, sp. n., p. 605.
a, Spider, enlarged; *b*, *c*, palpus in two positions; *d*, genital aperture (♀); *e*, natural length (♂).

16. *Lycosa inopina*, sp. n., p. 607.
a, Spider, enlarged; *b*, *c*, palpus in two positions; *d*, natural length.

88. *Attus delectus*, Cambr., p. 610.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, female, from above, without legs or palpi; *d*, *e*, right palpus in two positions; *f*, natural length (♀); *g*, ditto (♂).

103. *Attus spiniger*, Cambr., p. 610.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, *d*, right palpus in two positions; *e*, natural length.

17. *Attus regillus*, L. Koch., p. 611.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, *d*, right palpus in two positions; *e*, natural length.

90. *Attus oculatus*, sp. n., p. 612.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, *d*, right palpus in two positions; *e*, natural length (♂); *f*, genital aperture (♀).

110. *Attus memorabilis*, sp. n., p. 618.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, female, above, without legs; *d*, *e*, right palpus in two positions; *f*, natural length (♂); *g*, ditto (♀).

92. *Yllenus saliens*, sp. n., p. 620.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, *d*, right palpus in two positions; *e*, natural length.

89. *Menemerus animatus*, sp. n., p. 622.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, *d*, palpus in two positions; *e*, natural length.

4. Note on the "Africa-Indien" of A. von Pelzeln, and on the Mammalian Fauna of Tibet. By W. T. Blanford, F.R.S., F.Z.S.

[Received June 6, 1876.]

I am indebted to the kindness of Herr August von Pelzeln for copies of two papers lately written by him on the mammalian fauna and avifauna of India and Malayasia. The first, entitled "Africa-Indien"*, was published last year; the second, on the Mammalian fauna of the Malay countries †, has just reached me. These papers are well worthy the attention of all interested in the question of the geographical distribution of animals. I have for some years past contended that the fauna of India proper, or Hindustan as it is often called on European maps (Hindustan in India itself has a much more restricted signification), is not an integral part of the so-called "Indian region" of Dr. Sclater and other naturalists. My views were adopted by the late Dr. Stoliczka, and were identical with those held by Mr. Blyth‡. It is very satisfactory to find similar views enforced independently by so high an authority as Herr von Pelzeln and in so careful an essay.

The whole world is divided by v. Pelzeln into six regions, viz:—

I. The Arctic (comprising the Palæarctic and Nearctic of Sclater).
II. The American Tropical (Neotropical of Sclater).
III. The Australian.
IV. The Ethiopian.
V. The Hindustan (India and Ceylon).
VI. The Malay, including the Himalaya, Tibet, Southern China with Formosa, "Hinter-Indien" (*i. e.* Burma, Siam, and the Malay peninsula), the Sunda archipelago up to Wallace's line—and probably Madagascar, the Mascarene, Comoro, and Seychelles Islands (Lemuria).

I am rather disposed, with Andrew Murray §, to unite the Ethiopian and Malay regions with India and Lemuria into one great region; and I still hold that the hills of Southern India with the Malabar coast and Southern Ceylon form a province of the Malay region, whilst the greater portion of the Indian peninsula is African in its affinities *. This subject, however, is too large for discussion in the present note, the principal object of which is to point out a correction which is, I think, of some importance, with regard to the fauna of Tibet. This is, by v. Pelzeln, included in the Malay region: he comprises the typical Tibetan genera such as *Panthalops* and *Poëphagus* in his list of Malay forms; and on the map accompanying the paper on the Malay mammal-fauna the Kuenluen range is shown as the northern limit of the region.

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* "Africa-Indien, Darstellung der Beziehungen zwischen der africanischen und indo-malayischen Vogel-Fauna nebst allgemeineren Betrachtungen über die geographische Verbreitung der Säugethiere, von August von Pelzeln, Custos des k.-k. zoologischen Hof-Cabinets," Verhandl. k. k. zool.-bot. Ges. Wien. 1875, pp. 33–62.

† Ueber die malayische Säugethier-Fauna von August von Pelzeln. Separat-Abdruck aus dem Festschrift zur Feier des 25-jährigen Bestehens des k.-k. zool.-bot. Ges. in Wien.

‡ See his remarks on the division of the earth into zoological regions; Nature, 1871, vol. iii. p. 427.

§ 'Geographical Distribution of Mammals,' p. 304. I may remark that Mr. Murray's maps, so far as they exhibit the distribution of particular genera in India, are frequently incorrect. Thus Map xx. represents that there is no Wolf in India, whilst in Maps xxv., xxvii., xli., xlvi., and lxiii. the following mammals are represented as ranging more or less throughout the peninsula to Cape Comorin—*Mydaus*, *Helictis*, Binturong, Wild Ass, Rhinoceros, and European Mole! With the doubtful exception of the Rhinoceros, not one of these animals is found in the peninsula of India, the Wild Ass being confined to the deserts of Cutch and Bikanir. There are other mistakes in matters of detail.

The fauna of the Tibetan plateau has, in reality, no Malay affinities; but the cause of the misunderstanding is simple. The two naturalists to whose writings one naturally turns for information about Tibetan animals, are Mr. Hodgson and Père David; and both are eminently misleading, since both collected simultaneously specimens from two faunas which have in fact scarcely a generic type in common—the Himalayan, which is quite correctly classed by v. Pelzeln as a subdivision of the Malay region, and the Tibetan, which is part of Blyth's Mongolian province belonging to the Boreal or Palæarctic region. The former possessess a very rich fauna with numerous peculiar types; the latter is poor in species, though individuals are locally numerous. It is consequently not surprising that the few members of the Tibetan fauna which show peculiarity should be ignored amongst the vast bulk of Himalayan genera, and that Tibet should be assigned to the Malay region.

On the southern slopes of the Himalayas there is everywhere, until it has been cleared, luxuriant forest up to at least 12,000 feet above the sea, inhabited by a fauna which extends without any great change of generic forms, throughout the Malay peninsula and into the hill-tracts of some at least of the Malay islands †. Immediately ‡ north of the main Himalayan range, a cold, barren, and desert region of mountains and plateaux extends, swept by winds from which all moisture has been drained by the high mountain-chains on all sides. To this tract not one of the forest-haunting inhabitants of the Himalayas ever penetrates, although many of them extend far into the mountains along the damp and richly wooded valleys of rivers. The fauna of these Tibetan plateaux is essentially Boreal, Alpine and even Arctic types prevailing, the country having in many parts a climate scarcely equalled elsewhere for intensity of cold out of the Arctic regions. This high barren tableland extends from Afghanistan to Yunan; it comprises the drainage-areas of the Upper Indus and the Sanpú, and is bounded on the north in its western portion by the Kuenluen range; but it is less defined and its boundaries less accurately known to the eastward, although much light has been thrown upon the subject by Prejewalski's explorations.

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* J. A. S. B. 1870, vol. xxxix. pt. 2. p. 336.

† Elwes, P. Z. S. 1873, p. 615.

‡ How sudden the change is, in places, is admirably described in Hooker's 'Himalayan Journals,' vol. ii. p. 158.

Lately, when examining the collections brought by Dr. Stoliczka from Western Tibet and Eastern Turkestan, I endeavoured to make a list of the mammals known to inhabit the Tibetan plateau. The list is naturally very imperfect; but still, I think, it is of some value, because it serves completely to dissipate the idea of there being any thing in common between the fauna of Tibet and that of the Himalayan-forest region or the Malay region. It is quite true that a few forms such as *Lagomys* and *Arvicola* extend into the alpine portion of the Himalayan region; but this may be partly due to a law of diffusion which is always found to prevail on the edge of two different zoological provinces, if no impassable physical barrier intervenes. Moreover the Himalayan species are generally distinct from the Tibetan; and they may be members of a Boreal fauna to which *Cervus cashmeriensis* and *Ursus isabellinus* * belong, and which is well developed in Kashmir and may, I think, be traced throughout the Himalayas.

In the list which I append, W. is added to the names of all species only known from Western Tibet, E. to those hitherto brought from Eastern Tibet alone.

LIST OF MAMMALIA KNOWN TO INHABIT THE TIBETAN PLATEAU.

CHIROPTERA.

Plecotus auritus. W.

INSECTIVORA.

Sorex (*Crocidura*) *myoides.* W.

CARNIVORA.

Felis uncia.
Felis manul. E.
Felis isabellina.
Canis laniger (=*C. chanco*).
Canis niger (perhaps a variety of the foregoing).
Canis (*Vulpes*) *montanus* (=*C. flavescens*).
Canis (*Vulpes*) *ferrilatus.* E.
Canis (*Cuon*) *alpinus* †?
Martes toufæus.
Mustela erminea.
Mustela temon.
Putorius larvatus. E.
Lutra, sp. W.

RODENTIA.

Arctomys caudatus. W.
A. himalayanus (=*A. robustus*).
Sciurus europæus? E.
Mus crassipes? W.
Arvicola blythi (= *Phaiomys leucurus*, Blyth). W.
Arvicola stoliczkanus. W.
Lepus tibetanus. W.
Lepus oistolus (perhaps the same as the next).
Lepus pallipes.
Lepus hypsibius. W.

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* Neither of these species is found, except as a straggler, on the north of the dividing range between Kashmir and Ladák.

† It is more probably this species (which Gray, Cat. Carn. &c. Mamm. B. M. 1869, p. 184 has shown to be a *Cuon*) than the Indian *C. rutilans* which inhabits Tibet.

Lagomys ladacensis (=*L. curzoniæ*, Stol. nec Hodgs.). W.
Lagomys auritus. W.
? *Lagomys curzoniæ* (?=*L. tibetanus*). E.

UNGULATA.

Equus hemionus.
Bos grunniens.
Ovis hodgsoni.
Ovis vignei. W.
Ovis nahura.
Capra sibirica.
Panthalops hodgsoni.
Gazella picticauda.

It is possible that *Budorcas taxicolor*, the Musk-deer, and *Cervus affinis* should be added; but I have grave doubts as to whether any of these are really found on the Tibetan plateau. *Budorcas* may, like *Nemorhædus* and *Hemitragus*, be Himalayan, whilst I suspect that the Musk-deer and *Cervus affinis* belong to the Boreal or Palæarctic types of the Himalayan alpine fauna already referred to. I feel also very doubtful whether *Lagomys curzoniæ* is the species found in the Tibetan valleys north of Sikkim. The Chumbi valley, whence *Lagomys curzoniæ* and *Cervus affinis* are said to have been procured, belongs politically to Tibet, but it is Cis-Himalayan.

I should point out that this slight correction in no way invalidates any of Herr v. Pelzeln's views. There are a few errors in matters of detail, such as the inclusion of *Gazella*, *Antilope*, and *Mellivora* in the list of Malay genera, on the ground, apparently, of their supposed occurrence in Nipal. This must, I think, be due to the British-Museum catalogues of Mr. Hodgson's collections, in which a considerable number of animals are included, obtained from other parts of India than Nipal, although there is no means afforded by the catalogue of distinguishing them from the species collected in the Himalayas.

In conclusion I can only call attention to the very interesting palæontological suggestions at the end of Herr v. Pelzeln's papers. He considers the Malay fauna to be allied to that which inhabited Europe in older Miocene times, while he associates the newer Miocene mammalian fauna of Europe and India with that inhabiting the Ethiopian region at the present day. I can only remark upon this that several of the early Miocene forms of Europe (e. g. *Erinaceus*, *Castor*, *Myoxus*, *Cricetodon*, *Hyomoschus*, *Antilope*) are not Malay forms at present, and that the last two are African, whilst part of the apparent similarity is perhaps due to the warm climate of the early Miocene epoch in Europe—and that the Indian Sevaliks are much more probably Pliocene than Miocene. It is, however, very unfair to dismiss a carefully reasoned argument with a criticism of this kind; and I only regret that, just at present, time will not allow me to do justice to Herr v. Pelzeln's views.

5. On some of the Specific Identifications in Dr. Günther's Second Report on Collections of Indian Reptiles obtained by the British Museum. By W. T. Blanford, F.R.S., F.Z.S.

[Received June 6, 1876.]

Dr. Günther, in his "Second Report on Collections of Indian Reptiles obtained by the British Museum" (P. Z. S. 1875, p. 224), has made some "short remarks on species of reptiles recently named and described—not with the object of correcting nomenclature, but rather with the view of inviting the authors of those species to reconsider the characters on which they have based them." As some of the remarks in question refer to species distinguished, though in no case originally described by myself, I took the first opportunity, after seeing Dr. Günther's paper, of reexamining the specimens on which my opinions had been founded. I have also examined some of the types described by the late Dr. Stoliczka. The result is that I am unable in some cases to agree with Dr. Günther; and in one case I think I can show that some mistake has been made. I will take Dr. Günther's identifications in the order in which they occur*.

1. Cabrita brunnea.

Dr. Günther is, I believe, right in considering this the same as *C. leschenaulti*. In 1871 I collected many specimens of the former (which I had previously considered distinct), and I could find no difference except in the number of postnasals; and this depends on the circumstance that the lower nasal is sometimes united to the lower postnasal, sometimes separate. The same variation is occasionally met with in *Ophiops elegans*.

I found *Cabrita leschenaulti* common in the Godavery valley near Badrachellum; and I noticed that the very young which abounded in the month of April had always two postnasals, but that as they grew larger the lower postnasal appeared to become united to the lower nasal. It is possible (as I did not remain in one spot) that the distinction was local, and that the young Lizards in one place had two postnasals, in another one; but after the animals had grown rather larger I could find none with two postnasals, although those I found at first all had them. The head-scales in the very young animals are quite smooth.

2. Ophiops jerdoni, Blyth.

Dr. Günther unites with this *Cabrita jerdoni* of Beddome and myself, *Pseudophiops theobaldi*, Jerdon, and *Ophiops bivittatus* of Beddome. The last two identifications had already been made by Beddome (Madras Med. Journ. 1870) and by Stoliczka (J. A. S. B.

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* Dr. Günther has, I think, overlooked the circumstance that many of his identifications had been anticipated by the late Dr. Stoliczka (J. A. S. B. 1872, xli. pt. 2, pp. 86–135).

1872, p. 89). With regard to *Cabrita jerdoni*, it is probable that Dr. Günther and I have examined different Lizards. Although I thought it remarkable that I should have made so very clumsy a blunder as to mistake an *Ophiops* for a *Cabrita*, I carefully reexamined my original specimens of *C. jerdoni*, and found that they had the well-developed lower eyelids characteristic of the latter genus. On account of its transparency this lower eyelid is easily overlooked; but it is not likely that Dr. Günther has made a mistake of this kind; and as the British Museum possesses Col. Beddome's types, I should be inclined to conclude that I was in error in identifying the Lizard I obtained in the Godavery valley and elsewhere with *Cabrita jerdoni*, if it were not for Col. Beddome's original description of the species*. It is a subject of regret to every Indian herpetologist that Col. Beddome should have published descriptions of his numerous interesting discoveries in Southern India in a medical journal; and it is very possible that no copy of the work exists at the British Museum. I therefore copy the following paragraphs from the description in question:—

"*Cabrita jerdoni* (Bedd.). Two loreals, snout more pointed than in *C. leschenaulti*; .... *lower eyelid transparent*; .... femoral pores twelve on each thigh, &c.

"Only a single specimen of this interesting Lizard was procured, between Cotegal and Caverypooram. In its large scales it much resembles an *Ophiops, but has a distinct lower eyelid.*

"An *Ophiops*, which I take to be *O. jerdoni*, Blyth, is very abundant near the banks of the Tamboodra, north of Adoni, on red soil; and I have found the same species at Pothanore. It is very similar in colour to the *Cabrita* here described, and the scales of the back are similar in size; *it, however, wants the lower eyelid, and differs in the shields of the head, and has a much shorter tail, and only* 8–9 *femoral pores on each side.* A casual observer, however, might take the two to be the same species."

Now I think it is impossible to read the above paragraphs (the italics are my own) and to doubt that Colonel Beddome, when he wrote them, was well acquainted with the two species, *Ophiops jerdoni* and *Cabrita jerdoni*. I sent a specimen of the Lizard which I identified with the latter to Col. Beddome; and he assured me it agreed exactly with his type, as I mentioned in my paper, *l.s.c.* p. 348, note.

3. HEMIDACTYLUS COCTÆI.

Dr. Günther unites to this *H. bengaliensis*, Anderson (already shown to be identical by Stoliczka, *l.c.* p. 98), *H. giganteus*, Stoliczka, and *Doryura berdmorei* of Blyth and others.

It is very probable that the single specimen of *Hemidactylus giganteus* examined by Dr. Günther was a female, and that the tail was entirely renewed, in which case it could not easily be distinguished from *H. coctæi*. I have reexamined four specimens of *H. giganteus*—a pair (male and female) in the Indian Museum, and another similar pair which I had kept myself; and I agree with Dr. Stoliczka in considering it a distinct species. The two males have, one 18, the other 19 femoral pores in each thigh. In the two specimens retained as types of the species in the Indian Museum the basal portion of the tail appears not to have been renewed, and it is distinctly and regularly ringed. In one specimen especially, three rings remain which show no signs of ever having been renewed (the terminal portion of the tail is palpably a regrowth). In the other there are eight rings preserved at the base of the tail, but they are not so clearly of original growth. In neither of these specimens are there any enlarged tubercles on the tail.

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* Madras Monthly Journal of Medical Science, Jan. 1870, p. 34.

Dr. Stoliczka, who examined large numbers of specimens, never found more than eight femoral pores in each thigh in *H. coctæi*. In the Museum-specimens, which, however, are not numerous, I find five or six, whilst there is always an enlarged tubercle on each side of the tail on the posterior portion of each ring. The only specimens of this species I can find in the Museum are from Calcutta and Allahabad: they are labelled *H. bengaliensis*, Anderson. If Dr. Günther has specimens from other localities with more numerous femoral pores, it is to be hoped he will publish the fact.

So far as I can judge, *H. giganteus* comes nearer to *H. leschenaulti* than to *H. coctæi*. The former, as a rule, is distinguished by having tubercles on the back; but this is not always the case.

Nor can I agree in identifying *Hemidactylus berdmorei* (*Leiurus berdmorei*, Blyth; *Doryura berdmorei*, Theobald) with the young of *H. coctæi*. Blyth's type specimen is in the Museum here; and on comparing it with a specimen of *H. coctæi* of the same size, I find that the tail of *H. berdmorei*, which does not appear to have been reproduced, is quite smooth; whilst in that of *H. coctæi* the tubercles at the side, although small, are distinctly seen. The scales of the abdomen are a little larger in *H. berdmorei*; but the most characteristic distinction of the latter is in its very much smaller feet and toes, the latter being but little more than half the size of those of *H. coctæi*. The plates beneath the toes appear more numerous and broader in *H. coctæi*; but the type of *H. berdmorei* is not in good condition, and it is difficult to examine it closely. Lastly, Dr. Stoliczka has pointed out that in *D. berdmorei* there are from fourteen to sixteen pores in each thigh, whilst, as already mentioned, he never found more than eight in *H. coctæi*. It is true that the number of femoral pores varies in individuals with all Lizards; but still the amount of variation, so far as my experience goes, keeps within limits; and I think the distinction, that one species has habitually six to eight pores in each thigh, and another fourteen to sixteen, is probably sufficient to show that they are different forms.

I cannot find Dr. Stoliczka's specimens of *Hemidactylus berdmorei*: they do not appear to be in the Museum here.

Calcutta, May 12, 1876.

6. On the *Sterninæ*, or Terns, with Descriptions of three new Species. By HOWARD SAUNDERS, F.L.S., F.Z.S.

[Received June 6, 1876.]

(Plate LXI.)

Having recently had opportunities of examining some interesting types of various real and supposed species of the subfamily *Sterninæ*, I propose to anticipate to a certain extent the monograph of the *Laridæ* upon which I have been for some time engaged, and to give the result of my observations in the following review of the species at present known to me, with general remarks upon their geographical distribution.

The principal writers who have hitherto treated of the *Sterninæ* are:—Prof. Schlegel, in the Mus. d'Hist. Nat. Pays-Bas, *Sternæ*, 1863; Prof. Blasius, in Journ. für Orn. 1866, p. 73; Dr. Elliott Coues, in Proc. Phil. Acad. 1862, and monographically, as regards the North-American species, in his 'Birds of the North West' 1874; and Messrs. Sclater and Salvin (Neotropical Laridæ, P. Z. S. 1871). And from the works of these able authors I have derived much assistance, especially from the last, owing to the care with which the synonymy and the geographical distribution have been worked out. Indeed as regards America I might well have been content to wait until the completion of my monograph; but as there are a good many species in other parts of the globe which have not been so recently noticed, there may be room for a few remarks.

It is almost needless to say that, owing to the general similarity in colour, the *Sterninæ* are a troublesome subfamily to handle, the question of what constitutes specific distinctness being here more than usually perplexing. The individual differences in size of bill, length of wing, &c. are often considerable; added to which there are subtile gradations in the various shades of plumage, which render it impossible to accord specific rank to forms which, when judged by their extremes alone, seem totally distinct. Under these circumstances it is not surprising that a species should sometimes be based upon what may appear at the first glance to be a very slight distinction; for the alternative is to unite under one head some forms which are clearly different; and considering the general tendency that there is towards blending, the systematist must be glad to avail himself of the smallest *permanent* characteristic. The young are often very much alike; and indeed in several cases they are as yet undistinguishable with the limited material at present available; but larger series of authentic specimens will doubtless clear up several points. The coloration of the soft parts presents considerable difficulties, owing to the changes which take place at different ages and seasons, it frequently happening that the bill and legs in quite young birds increase in intensity of colour up to a certain time in autumn, and then become dark, the brighter colour not being resumed until the following spring: this is notably the case with the Common and the Arctic Terns, in which the bills become dark very suddenly between the

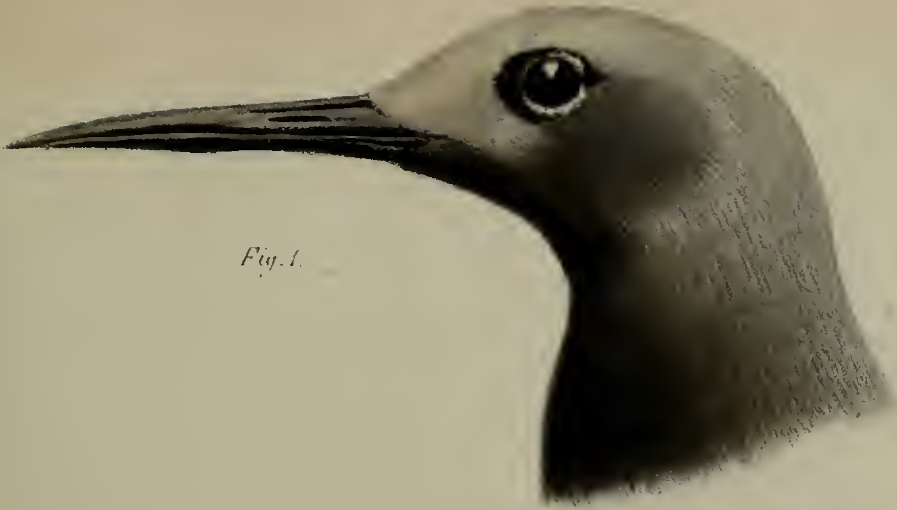

Fig. 1.

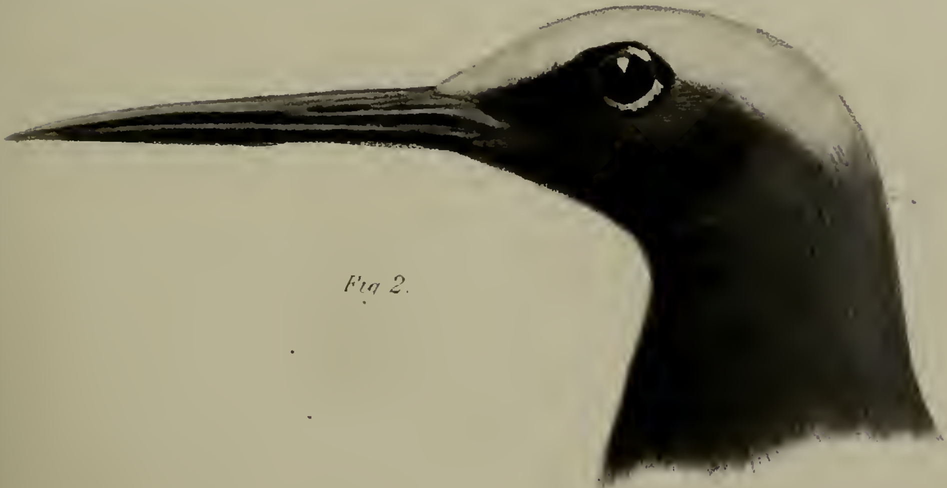

Fig. 2.

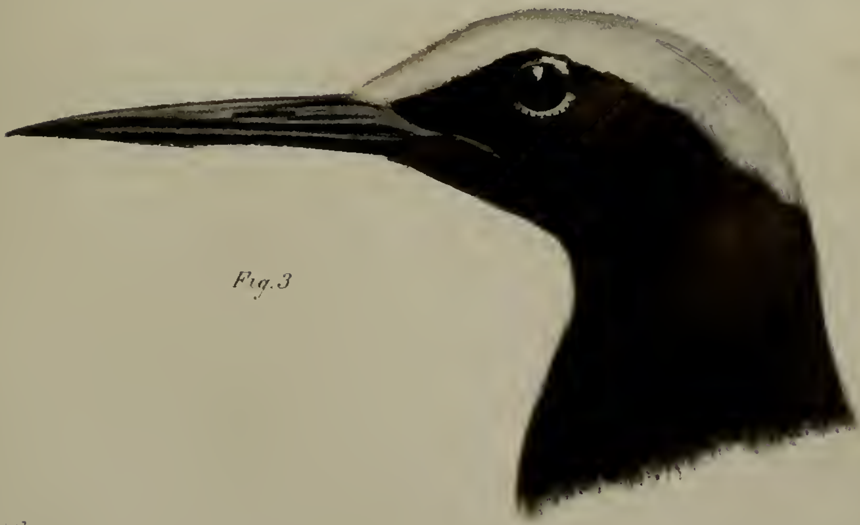

Fig. 3

J. Smit del et lith

M & N Hanhart imp

Fig 1 ANOUS TENUIROSTRIS
2 " MELANOGENYS.
3 " LEUCOCAPILLUS

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Z. [illegible] D
TURAL HISTORY

first and second weeks in October. At this season, too, the grey tint on the rump and tail-coverts which is also assumed by some species is apt to lead to confusion. Of the difficulties presented by the wearing-away of the grey frosty surface on the primaries, giving an abnormal appearance to their pattern, it is not necessary to say anything beyond drawing attention to their existence.

After careful examination of the representatives of all the genera into which this subfamily has been divided, I am unable to discover any satisfactory reasons for the adoption of more than five, viz. *Sterna*, *Hydrochelidon*, *Nænia*, *Gygis*, and *Anous*. It is true that in many forms there appears to be considerable departure from what we have been accustomed to consider typical *Sterna*; and this was especially evident to those systematists who treated principally of European or North-American species; but when the various species of the whole world are examined, so many connecting links and gradations will be found to exist, as to reduce the structural distinctions to a minimum, and to preclude the possibility of adopting with any degree of consistency several genera which at first glance seemed valid enough. For example, the Sooty Terns (*S. fuliginosa*, *S. anæstheta*, and *S. lunata*) have had no less than three genera erected for *one* of their number by Wagler alone, viz. *Onychoprion*, *Haliplana*, and *Planetis*, the definitions of which will hardly bear analysis; but even if any one of them were based upon genuine structural characters (which is not the case), there exists a far more important difference between the foot in *S. fuliginosa* and in that of *S. anæstheta*, than there is between *S. fuliginosa* and any typical *Sterna*, such as *S. fluviatilis*. It would strike any one as absurd to separate these two Sooty Terns generically, seeing that their resemblance is so close that for some time even their specific characteristics were by no means well known; yet, unless this is done, it is fully as inconsistent to separate them from true *Sternæ*. It is, however, unnecessary to say more upon this particular subject, as it will be noticed when treating of the species in question. The result of the mania which at one time prevailed for the manufacture of genera may be seen in the fact that whereas the members of the subfamily Sterninæ are about 50 in number, the genera erected for their reception are upwards of 30. It is true that many of these are merely vain repetitions of previously existing genera, the names of which did not happen to suit the fancy of the respective systematists, and that by discarding these synonyms the burden might be endured if the discrepancies of opinion as to the genera in which the various species should be located were not hopelessly irreconcilable, a single species being sometimes assigned to 7 or 8 different genera. Dismissing all but those which are based upon structural characters, independent investigations have led me to adopt substantially the genera accepted by the late G. R. Gray (Gen. Birds iii. p. 658), with the exception of *Phætusa*, which I put back under *Sterna*; whilst *Nænia*, which he puts with *Anous*, I consider valid; several species also which he assigned to *Hydrochelidon* are now restored to *Sterna*. Of the discarded genera even the best seem to be based upon the size and shape of the bill—a very variable character in Terns, and one which, when taken alone, does not seem to be of so much value in this family as in many others.

All things considered, the following arrangement of the various species seems to me to be the most natural; but, as is well known to all naturalists who have undertaken a similar task, it is impossible to attain to absolute consistency in locating the various members of a family in an ascending or descending scale; for the aberrant forms which frequently present themselves would destroy the best scheme that ever could be invented.

Genus Hydrochelidon, Boie.

This genus, originally instituted by Boie (Isis 1822, p. 563) for *H. nigra* and *H. leucoptera*, *H. hybrida* being left by him with *Sterna*, was, indeed, principally based upon coloration; but it has since been well defined and generally accepted as including the Marsh-Terns—of which the most characteristic distinctions are the short rounded tail, and the long slender toes connected by deeply incised webs. There is a general resemblance between the species which compose this very natural genus, the members of which agree in their habits, being gregarious at the breeding-season, and making their nests in the midst of marshy places. For convenience of treatment I commence with

Hydrochelidon hybrida (Pall.).

Sterna hybrida, Pall. Zoogr. Rosso-As. ii. p. 338 (1811); Schlegel, Mus. P.-B. *Sternæ*, p. 33 (1863).

Sterna leucopareia, Natterer, in Temm. Man. d'Orn. p. 746 (1820).

Sterna javanica, Horsfield, Trans. Linn. S. xiii. p. 198 (1820) (type examined in E. I. Mus., *H. S.*); Gray & Hardw. Ill. Ind. Zool. i. pl. 70. fig. 1 (1832).

Sterna grisea, Horsfield, Trans. L. S. xiii. p. 199 (1820) (type examined in E. I. Mus., *H. S.*).

Viralva indica et *V. leucopareia*, Steph. in Shaw's Gen. Zool. xiii. p. 171 & 169 (1825).

Sterna delamottei, Vieillot, Faun. Fr. p. 402 (1828).

Pelodes leucopareia, Kaup, Nat. Syst. p. 107 (1829).

Sterna similis, Gray & Hardw. Ill. Ind. Zool. i. pl. 70, fig. 2 (1832) (type examined in E. I. Mus., *H. S.*).

Hydrochelidon fluviatilis, Gould, P. Z. S. 1842, p. 140; Gould, B. Australia, vii. pl. 31 (1848).

Hydrochelidon hybrida, G. R. Gray, Gen. B. iii. p. 660 (1846); Blas. J. f. Orn. 1866, p. 82; Degl. & Gerbe, Orn. Eur. ii. p. 468 (1867); Swinhoe, P. Z. S. 1871, p. 421 (Formosa).

Hydrochelidon delalandii, Bp. Compt. Rend. xlii. (1856), p. 773 (type examined, *H. S.*).

Hydrochelidon indica, Jerdon, B of India, iii. p. 837 (1864).

Hydrochelidon leucopareia, Gould, Handbook to B. Australia, ii. p. 406 (1865).

Sterna innotata, Beavan, Ibis, 1868, p. 404 (imm.).

Pelodes delalandii, Gray, Hand-list, iii. p. 122 (1871).

Pelodes indica et *P. fluviatilis*, Gray, Hand-list, iii. pp. 121, 122 (1871).

Gelochelidon innotata, Gray, Hand-list, iii. p. 119 (1871).

Pelodes hybrida, Gurney, Andersson's B. of Damaraland, p. 362 (1872); Gray, Hand-list, iii. p. 121 (1871).

"*Sterna leucoptera*" (in error), Buckley, Ibis, 1874, p. 391 (Transvaal).

After examining a very large series, I am unable to detect any constant difference between European, Indian, and Australian specimens. Examples in breeding-plumage are absolutely identical; and it is much if a trifling inferiority in size can be remarked in the Indian, and a slightly paler tint in the coloration of the upper parts of Australian examples. The general range of the species may therefore be described as from the extreme west of Europe to the coasts of China and the island of Formosa and throughout the Malayan region down to Australia, principally the Queensland portion. It occurs in South Africa abundantly in winter, and probably breeds there, as Andersson obtained it in full plumage in April. In the British Museum there is a mounted specimen marked as obtained at Barbadoes and presented by Sir Robert Schomburgk, who was for some time Governor of that West-Indian colony; but there does not appear to be any other record of its occurrence so far west, even as a straggler.

HYDROCHELIDON LEUCOPTERA, Meisn. & Schinz.

Sterna fissipes et *S. nævia*, Pallas, Zoogr. Rosso-As. ii. pp. 337–8 (1811), nec Linn.

Sterna leucoptera, Meisner & Schinz, Vög. Schweiz, p. 264 (1815); Temm. Man. d'Orn. p. 483 (1815).

Hydrochelidon leucoptera, Boie, Isis, 1822, p. 563; Buller, B. New Zealand, p. 287 (1873); Dresser, B. of Europe, pt. xlv. (Nov. 1875).

Viralva leucoptera, Steph. in Shaw's Gen. Zool. xiii. p. 170 (1826).

Hydrochelidon leucopterum, Bp. Comp. List, p. 61 (1838).

Hydrochelidon nigra, G. R. Gray, Gen. Birds, iii. p. 660 (nec Linn.) (1849); Blas. J. f. Orn. 1866, p. 82; Swinhoe, Ibis, 1863, p. 97, P. Z. S. 1863, p. 28, P. Z. S. 1871, p. 421 (China); Gurney, Andersson's B. Damara-land, p. 363 (1872); G. R. Gray, Hand-list, iii. p. 121 (1871); Coues, B. N.W. America, p. 709 (1874).

Hydrochelidon subleucoptera, C. L. Brehm, Vogelfang, p. 350 (1855).

Hydrochelidon javanica, Swinhoe, Ibis, 1860, p. 68, 1861, p. 345 (nec Horsfield).

Sterna nigra, Schlegel. M. P.-B. *Sternæ*, p. 31 (1863).

Hydrochelidon niger, Severtzoff, Turk. Jevotnic, p. 70 (1873), fide Dresser.

The description of this species was given by Meisner and Schinz, and also by Temminck, under date of the same year; the former, however, give a coloured plate, and their claim to the earliest discrimination of its distinctness seems to be generally acknowledged. It is to be regretted that Mr. G. R. Gray and others should subsequently have identified it with *Sterna nigra* of Linnæus, for which there does not appear to have been any reasonable ground; for, as I trust to show when treating of the Black Tern, Linnæus's description can only apply to that species.

By its longer and more slender toes and claws, and deeply incised webs, this species may be distinguished from *H. nigra* at all ages; whilst its generally smaller dimensions serve to separate the young from that of *H. hybrida*. In the immature plumage also the upper tail-coverts are whiter than in *H. nigra*, in which the grey of the back continues over the rump and throughout the tail; but the above white band is somewhat dependent upon the make of the skin, and is not an unfailing guide with such specimens as the one Mr. J. H. Gurney had before him (which is now in my collection) when he identified it as *Sterna fissipes*. On raising the feathers on the rump, however, it will be seen that there is much more white at the base of those of *H. leucoptera* than in those of *H. nigra*; and in properly preserved skins the white band on the rump is clearly defined even in very young birds. The adults in summer can hardly be mistaken even on the wing, the *black* under wing-coverts being very conspicuous, (whereas in *H. nigra* they are *pale grey*); in winter and immature plumage the under wing-coverts are *white*.

A straggler to northern Europe, this Tern becomes abundant in the south and south-east, ranges throughout Siberia and China, and reaches to the Transvaal and Damaraland and to Abyssinia, whence I have several specimens, all in immature plumage; there is, however, little doubt that it breeds there. It has also been obtained in Australia and New Zealand, and is recorded by Dr. E. Coues as having been captured in Wisconsin, U. S., on 5th July 1873, in full breeding-plumage.

HYDROCHELIDON NIGRA (Linn.).

Sterna nigra, Linn. S. N. i. p. 227 (1766), F. S. p. 159; Meyer & Wolf, Tasch. Deutsch. Vög. ii. p. 461 (1810); Temm. M. d'Orn. p. 484 (1815).

Sterna nævia, Linn. S. N. i. p. 228 (1766), ex Brisson (jr.).

Sterna fissipes, Linn. S. N. i. p. 228 (1766); Schlegel, Mus. P.-B. *Sternæ*, p. 29 (1863).

Larus merulinus, Scop. Ann. i. Hist. Nat. p. 81 (1769).

Sterna surinamensis, Gm. S. N. i. p. 604 (1788).

Sterna plumbea, Wilson, Am. Orn. vii. p. 83, pl. 60 (1813).

Hydrochelidon nigra, Boie, Isis, 1822, p. 563.

Viralva nigra, Steph. in Shaw's Gen. Zool. xiii. p. 167 (1824).

Anous plumbea, Stephens, in Shaw's Gen. Zool. xiii. pt. i. p. 142 (1826); (ex Wilson).

Hydrochelidon fissipes, G. R. Gray, Gen. Birds, iii. p. 660 (1849); Blas. J. f. Orn. 1866, p. 82; Degl. & G. Orn. Eur. ii. p. 465 (1867);

Scl. & Salvin, P. Z. S. 1871, p. 573; Coues, Proc. Phil. Acad. (1862), p. 554; G. R. Gray, Hand-list, iii. p. 121 (1871).

Hydrochelidon plumbea, Lawr. B. N. Am. p. 864 (1858); et al. auct. Am.

Pelodes surinamensis, Gray, Hand-list, iii. p. 122 (1871).

Hydrochelidon lariformis, Coues, B. N.W. Am. p. 704 (1874).

"*Sterna cæsia*, Linn." Gundlach, J. f. Orn. 1875, p. 393, (? error for *S. nævia*).

Sterna nigra of Linnæus (Syst. Nat. p. 227, 1766) is based upon his *Sterna* 159 of the 'Fauna Suecica' ed. 1761, in which he accurately describes the Black Tern, adding that "it is found on the small reedy islands about Upsala." This can only refer to the present species, as the White-winged Black Tern is one of the rarest of stragglers to any part of Sweden. Linnæus also refers to Albin's plate and description, Av. ii. p. 82, pls. 89 & 90, which are unmistakable. There is therefore no warranty whatever for identifying his *S. nigra* with the south-eastern species. I have gone carefully into the question; and any one who is willing to take the trouble of examining the matter for himself will, I have no doubt, share my opinion.

In almost all the adult American specimens which I have examined, about a dozen in number, the black of the underparts is of a deeper and more sooty brown tint than in any European examples out of upwards of a hundred from various localities, the black being as dark as in *H. leucoptera*, an intensity of hue which our form never possesses. In two or three examples, however, all females, the lightest-coloured American birds approach more closely to very dark specimens from Europe; and in the young and winter plumage the two forms are absolutely undistinguishable; so that any specific separation is out of the question. This species is found throughout Europe, Palestine, and N. Africa to the Nile; to S. Africa it appears to go only as a winter and somewhat rare visitant, as I only know of one example, obtained 4th Jan. 1871 at the Cameroons (the birds collected by Mr. Ayres and others being *H. leucoptera* in immature plumage); nor do I know of its occurrence in India. In America it ranges throughout and across the northern continent, visiting the West Indies and Spanish main on the one side, and going as far south as Peru and Chili on the Pacific coast in winter.

Genus Sterna, Linn. (part).

Sterna magnirostris, Licht.

Sterna magnirostris, Licht. Verzeichniss Doubl. p. 81 (1823) (type in Berlin Mus.; examined, *H. S.*); Max. v. Wied, Beit. iv. p. 861 (1833); Tschudi, F. Per. Aves, p. 305 (1846); Schlegel, Mus. P.-Bas, *Sternæ*, p. 12 (1863).

"*Sterna speculifera*, Temm.," Lesson, T. d'Orn. p. 622 (1831); Pucheran, Rev. Zool. 1850, p. 544.

"*Sterna albifrons*, Cuv.," Lesson, Tr. d'Orn. p. 622 (1831) (sp. in Paris Mus. examined, *H. S.*).

Phaëtusa magnirostris, Wagler, Isis, 1832, p. 1224 (type of genus *Phaëtusa*); Scl. & Salvin, P. Z. S. 1871, p. 567; Gray, Hand-list, iii. p. 120 (1871).

Sylochelidon magnirostris, Blasius, J. f. Orn. 1866, p. 82.

This large-billed Tern with a slightly forked tail, but with amply webbed feet, is found far up the great rivers and along the coasts of tropical America from the equator down to about 35° S. Its eggs, which are deposited on the sandbanks, are similar in character to those of *S. anglica*; and taking all its characters into consideration, without relying only on the shape of the bill, it is difficult to allow its generic distinction without admitting a host of other and confusing genera.

STERNA ANGLICA, Mont.

Sterna anglica, Mont. Orn. Dict. Suppl. (1813) (type in Brit. Mus.); Schlegel, Mus. P.-Bas, *Sternæ*, p. 34 (1863); Degl. & Gerbe, Orn. Eur. ii. p. 450 (1867).

Sterna aranea, Wilson, Am. Orn. viii. p. 143, pl. 72. fig. 6 (1814).

Sterna affinis, Horsfield, Trans. Linn. Soc. 1820, xiii. p. 199 (type examined in E. I. Mus., *H. S.*).

Thalasseus anglicus, Boie, Isis, 1822, p. 563.

Viralva anglica, Steph. in Shaw's Gen. Zool. xiii. pt. i. p. 174 (1826).

Gelochelidon balthica, Brehm, H. Vög. Deutsch. p. 772 (1831).

Gelochelidon meridionalis, Brehm. H. Vög. Deutsch. p. 774 (1831) type of genus *Gelochelidon*.

Laropis anglica, Wagler, Isis, 1832, p. 1225 (type of *Laropis*).

Sterna macrotarsa, Gould, P. Z. S. 1837, p. 26.

Gelochelidon anglica, Coues, Proc. Phil. Ac. 1862, p. 536; Jerdon, B. India, iii. p. 836 (1864); Blasius, J. f. Orn. 1866, p. 82; Scl. & Salvin, P. Z. S. 1871, p. 572; Coues, B. N.W. Am. p. 664 (1874).

Gelochelidon macrotarsa, Gould, B. Austr. Suppl. pl. 81 (1869), Handbk. B. Austr. ii. p. 403 (1865); Gray, Hand-list, iii. p. 119 (1871).

Gelochelidon nilotica, Gray, Hand-list, iii. p. 119 (1871).

Gelochelidon aranea, Gray, Hand-list, iii. p. 119 (1871).

In this case also, in spite of its stout bill, the short and somewhat rounded lateral feathers of the tail, and the long hind toe, I do not think we can consistently allow a generic distinction without admitting a number of indifferent genera. In its habits this bird appears to partake rather of the nature of the Sea-, than of the Marsh- or River-Terns, and although the shape of the tail is somewhat rounded as in *Hydrochelidon*, it must be remembered that *S. caspia* has a similar tail, and that both these species have the strong and fully webbed feet of the Sea-Terns. On the whole it would seem advisable to avoid undue multiplication of genera by retaining this species amongst the *Sternæ*.

It is now generally admitted that the American *S. aranea* is identical with the European bird; and I can see no ground for considering Mr. Gould's *Sterna macrotarsa* from Australia to be specifically distinct. The range of the species is therefore from

Western Europe to the China seas, throughout India, Ceylon, and the Malay region down to Australia, and along the east coast of America as far as Patagonia; on the Pacific side it has only been observed in Guatemala (Salvin). It does not appear to have been recorded from South Africa, which is somewhat remarkable.

Mr. G. R. Gray chose to identify this species with Hasselquist's *S. nilotica*; but there is nothing in his description to prove that this was the bird referred to; and in any case the name would not be available, as it antedates the 12th ed. of Linnæus's 'Systema Naturæ.'

STERNA SEENA, Sykes.

Sterna seena, Sykes, P. Z. S. 1832, ii. p. 171. no. 231.

Sterna aurantia, Gray & Hardw. Ill. Ind. Zool. i. pl. 69. fig. 2 (1832).

Sterna brevirostris, Gray & Hardw. Ill. Ind. Zool. i. pl. 69. fig. 1. juv. (1832).

Sterna roseata, Hodgson, Gray's Zool. Misc. p. 86 (1844).

Seena aurantia, Blyth, Cat. Birds Mus. As. S. B. p. 291. no. 1706 (1849) (type of subgenus *Seena*); Jerdon, B. India, iii. p. 838 (1864); Blasius, J. f. Orn. 1866, p. 73.

Although the stout curved bill of this species is somewhat peculiar, this seems to be hardly sufficient to warrant its elevation to the rank of a subgenus. The webs of the toes are of moderate extent and not much excised; the tail is *long* and *forked*, as in typical *Sterna*.

This Tern breeds on the sandbanks of the Indian rivers; and the eggs are in appearance intermediate between those of *S. anglica* and the large-billed River-Tern of South America, *S. magnirostris*. It appears to be confined to the Indian region.

The names *seena* and *aurantia* are contemporaneous; but I adopt the former, because it is properly described; *S. aurantia* is undescribed, and merely based upon a bad plate.

STERNA MELANOGASTRA, Temm.

Sterna melanogaster (sic), Temm. Pl. Col. vol. v. pl. 434 (1838); Gould, B. Asia, pt. xix. pl. (1867).

Sterna javanica, Horsfield, in Zool. Res. (but not in Tr. Linn. Soc. 1820, xiii.); Jerdon, B. India, iii. p. 840 (1864); Irby, Ibis, 1861, p. 247.

Sterna acuticauda, Gray & Hardw. Ill. Ind. Zool. pl. 70. fig. 3 (1832).

Sterna melanogastra, Schlegel, Mus. P.-B. *Sternæ*, p. 21 (1863); Schl. & Poll. Rech. Madagasc. p. 147 (1868).

Hydrochelidon melanogastra, Bonap.

Sternula melanogastra, Blas. J. f. Orn. 1866, p. 74.

"*Sternula minuta*" et "*Sternula jerdoni*," Beavan, Ibis, 1868, p. 403 (clearly immature birds of this species).

Pelodes javanica, Gray, Hand-l. iii. p. 122 (1871).

Owing to its somewhat excised webs, and perhaps to its superficial resemblance in the dark coloration of the lower parts to *H. hybrida*, this species has been placed by Bonaparte and others in the genus *Hydrochelidon*; but its long, straight bill, and long, pointed tail show that its position is rather with the true *Sternæ*. It is an abundant species on most of the Indian rivers, in Ceylon, Burma, &c.; and in its manner of nesting on sandbanks, and in the character of its eggs, of which I have specimens before me, it differs from the Marsh-Terns.

As this species is constantly cited as "*Sterna javanica*, Horsfield," I may be excused for repeating that I have examined Horsfield's *type* specimen of "*Sterna javanica*" in the Indian Museum, and that it is undoubtedly *Hydrochelidon hybrida* (Pallas). As a straggler *S. melanogastra* has occurred during a tempest at the Island of Réunion.

STERNA ANTARCTICA, Wagler.

Sterna antarctica, Wagler, Isis, 1832, p. 1223 (ex J. R. Forster, MS.); J. R. Forster, Desc. Anim. p. 107 (ed. 1844); Buller, B. New Zealand, p. 283 (1873).

Hydrochelidon albostriata, G. R. Gray, Voy. Erebus & Terror, Birds, p. 19, pl. 21 (1844).

Sternula antarctica, Bonap. C. R. xlii. p. 773 (1856).

Hydrochelidon albistriata, Bonap. C. R. xlii. p. 773 (1856).

Sterna cinerea, Ellman, Zoologist, 1861, p. 7473.

Hydrochelidon hybrida, Finsch, J. f. O. 1867, p. 347.

Pelodes albistriata, Gray, Hand-list, iii. p. 122 (1871).

This species, of a nearly uniform smoke-grey colour, appears to be confined to New Zealand, and principally to the South Island, where it deposits its eggs on the bare ground, making no nest, and having in general the habits of a coast- or estuary-frequenting Tern. The foot is moderately stout, and the webs are but slightly scalloped; the upper mandible, which is slightly curved towards the tip, is quite different from that of *Hydrochelidon*, in which genus there seems to be no good reason for placing it. It is closely allied to the next species—a somewhat specialized form, found only, up to the present time, at Kerguelen Island.

STERNA VIRGATA, Cab.

Sterna virgata, Cabanis, J. f. Orn. 1875, p. 449.

"*Sterna vittata*, Gm.," Coues, in Bull. U.S. Nat. Mus. p. 17, 1875 (nec Gm. nec Von Pelzeln).

There are three specimens of this Tern in the British Museum, all from Kerguelen Island: two are in immature plumage; and one is a fine adult. The bill is rich blood-red, and the feet are red, whereas in *S. antarctica* those parts are yellow, or, at most, orange; the bill, also, in the Kerguelen bird is much straighter than in the New-Zealand form; and the tail is more deeply forked. It is, in fact, a more thoroughly Sea-Tern than its predecessor; in its nesting it is also peculiar, the *single* egg being deposited upon somewhat high and broken ground and on the slope of the hill-side (*Kidder*).

The egg is of the ordinary Tern-like character, with a trifle more olive-green in the ground-colour than is usual in eggs of *S. fluviatilis*, but which is not rare in a series of those of *S. macrura*. Dr. Kidder, Naturalist to the American Expedition to observe the Transit of Venus, describes the birds as very bold, swooping at the head of any one who approaches their breeding-grounds, and actually scaring the Skuas by their impetuous attacks. There can be no doubt that this was the species obtained by the Americans; but Dr. Coues is mistaken in identifying it with *S. vittata*, Gm., of which he can hardly have examined a genuine specimen, or he would never have confounded two such perfectly distinct species.

STERNA VITTATA, Gm.

Sterna vittata, Gm. S. Nat. i. p. 609 (1788) (founded on Latham's Wreathed Tern, from Christmas Island); Pelzeln, Novara-Reise, Vögel, p. 152 (1865) (full description).

Gmelin's description, founded on Latham, fairly suits this species, although I am inclined to doubt the correctness of the locality assigned, viz. Christmas Island, especially as there is no mention in Cook's Voyages of any Tern being found there, except the Sooty Tern, of which there is a full description. However, it has not been applied to any other bird; and in the Ornithology of the 'Voyage of the Novara,' Herr von Pelzeln adopted the name for the present species, obtained at St. Paul's Island, about 700 miles to the north of Kerguelen Island, giving a full description, both in Latin and German; so that the name may fairly be accepted. The British Museum possesses both adult (in breeding-plumage) and immature specimens obtained at St. Paul's Island in January 1853, and also a specimen from Kerguelen Island; there is another, taken on board H.M.S. 'Rattlesnake,' in 38° 22′ S., 0° 25′ W., on 27th February 1847; and I have a specimen, also captured on board ship, near the island of St. Helena, in April, for which I am indebted to my friend Mr. E. Hargitt. In general appearance this Tern much resembles *S. hirundinacea*, Lesson (*S. cassini*, Scl.); but it is decidedly smaller, and more generally washed with grey below; the bill, which is red, is rather weak, and tapers very suddenly from the angle to the tip. In the adult the tail is long, forked, and very white. It is interesting to find a species which apparently has its head quarters at St. Paul's Island, reaching down on the one hand to Kerguelen Island, where it meets with another species closely allied to *S. antarctica* of New Zealand, and then stretching away to the west of our meridian and approaching the limits of the South-American species, with which its affinities are undoubtedly strongest, and thus connecting South America with New Zealand by way of the islands of the South Atlantic Ocean.

STERNA HIRUNDINACEA, Less.

Sterna hirundinacea, Lesson, Tr. d'Orn. p. 621 (1831); Pucheran, Rev. Zool. 1850, p. 539 (Santa Catharina, Brazil; type in Paris Mus. examined, *H. S.*).

Sterna hirundo, Max. v. W. Beitr. iv. p. 865 (1833).

Sterna antarctica, Peale (nec Lesson, nec Wagler, nec Forst.), U.S. Expl. Exp. p. 280 (1848); Ph. & Landbeck, Cat. Av. Chilenas, p. 49.

Sterna meridionalis, Cassin (nec Brehm), U.S. Expl. Exp. p. 385 (1858); Schlegel, Mus. P.-B. *Sternæ*, p. 15 (1863).

Sterna wilsoni, Burm. Syst. Ueb. iii. p. 451.

Sterna cassinii, Sclater, P. Z. S. 1860, p. 391; Abbott, Ibis, 1861, p. 166; v. Pelzeln, Novara-Reise, Vög. p. 153 (1865); Scl. & Salv. P. Z. S. 1871, p. 570; Gray, Hand-l. iii. p. 118 (1871).

"*Sterna meridionalis*, Peale," Blasius, J. f. Orn. 1866, p. 74 (nec Peale).

The range of this species, as defined by Messrs. Sclater and Salvin, is from Rio de Janeiro southwards to the Falkland Islands, and up the west coast of Chili as far north as Valdivia. Since then I have received specimens from Colchagua, in about 35° S. lat.; and it may naturally be looked for even further north. It is the largest and the lightest in colour of the medium-sized Sea-Terns; and the entire bill (which is long and powerful) is bright red in the adult.

It is with regret that I do not adopt Mr. Sclater's name *S. cassinii*; but the examination of the type of *S. hirundinacea* shows that it is undoubtedly this species.

STERNA ALBIGENA, Reich.

Sterna albigena, Licht. Nomenclator, 1854 (descr. nulla); Reich. Schwimmvög. Suppl. xi. pl. xxi. fig. 816.

Hydrochelidon albigena, Bonap. Compt. Rend. 1856, ii. p. 773.

"*Sterna senegalensis*, Sw.," Heugl. Ibis, 1859, p. 351; König-Warth. Ibis, 1860, pp. 125, 432.

Sterna albigena; Heugl. Faun. Roth. Meeres, no. 307, p. 32 (descr.); Schlegel. Mus. P.-B. *Sternæ*, p. 20 (1863); Blasius, Journ. f. Ornith. 1866, p. 75; Finsch & Hartl. Vög. Ost-Afr. iv. p. 834, tab. x. fig. 2 (1870).

Pelodes albigena, Gray, Hand-list, iii. p. 122 (1871).

In order to show the connexion between the three preceding species, it was necessary to pass over the present, which is a local and smoke-coloured form of typical *Sterna*, having no real affinity with *Hydrochelidon*. The tail is long and pointed, the bill narrow and straight; the feet are amply webbed; and it is, in a word, a small, slender, Common Tern, of a general smoky hue, the rump and tail being as dark as the mantle. I cannot understand how Finsch and Hartlaub fail to identify Reichenbach's figure in the 'Schwimmvögel' with this species; for his illustration, though coarse, is decidedly far more recognizable than theirs in the 'Vög. Ost-Afrika's.' It is a very distinct form, which appears to have its head quarters in the Red Sea, south of the tropic of Cancer; and an interesting account of its breeding in the Dahalak archipelago is to be found in 'The Ibis,' 1861, p. 125. The eggs, two in number, are laid in July and August, on the flat coral reef, close to the beach, and resemble those of typical *Sterna*. Whilst writing this, Lord Walden has sent me two fine specimens, obtained near Bombay, a considerable extension of its range as hitherto known to us. There is no example of this Tern in the British Museum; but the collections at Leyden, Frankfort, Mayence, and Berlin are more fortunate in this respect.

STERNA FLUVIATILIS, Naum.

Sterna hirundo (in part), Linn. Syst. Nat. i. p. 227 (1766), and of most authors.

Larus bicolor, *Larus sterna* et *Larus columbinus*, Scop. Ann. i. Hist. Nat. p. 82, 1769 (nos. 110 & 112 im., 113 juv.).

Sterna fluviatilis, Naum. Isis, 1819, p. 1847–48; Gray, Hand-list, iii. p. 118 (1871); Sharpe & Dresser, B. Europe, pt. xi. (1872).

Sterna senegalensis, Sw. B. W. Af. ii. p. 250 (1837); Schl. Mus. P.-Bas, *Sternæ*, pp. 16 & 17 (1863) (sp. no. 2 examined by *H.S.*).

Sterna wilsoni, Bp. List, p. 61 (1838), et auct. American.; Gray, Hand-list, iii. p. 118 (1871).

Sterna macrodactyla et *macroptera*, Blasius, J. f. Orn. 1866, pp. 75, 76; Gray, Hand-list, iii. p. 118 (1871).

Sterna dougalli, Layard, B. S. Af. p. 369 (1867).

This well-known species is found throughout Temperate Europe, Asia, and America, except on the Pacific coast. In winter it visits the coast of Africa as far south as the Cape of Good Hope, and has occurred as far to the south-east as Ceylon, specimens having been sent to me by Capt. Vincent Legge, R.A. Northwards it goes as far as Pekin (*Swinhoe*); but in Tibet and part of Siberia it is replaced by a form which I consider to be distinct, and for which I propose the name of

STERNA TIBETANA, sp. nov.

S. *similis* S. fluviatili *sed ubique saturatior; supra schistaceo-cinerea; subtus pectore clare vinaceo facile distinguenda.* (From a specimen in Lord Walden's collection.)

Four adult specimens from Tibet and several from Lake Baikal ascribed to *S. longipennis* differ from the latter in having the bill and feet coloured as in *S. fluviatilis*, from which in turn they differ in having the sides of the neck, shoulders, and flanks of a clear grey, which assumes a darker and more vinous tint on the breast and abdomen; the mantle and wings are also much darker. The bill and feet are smaller than in average *S. fluviatilis*, and of an orange-red, the former tipped with horn. It is possibly this species which Mr. Hume mentions as breeding near Yarkand. The examples referred to above are all in breeding-plumage; but I believe *S. fluviatilis* is a rare bird even in Lower India, and only found there during the winter months.

STERNA LONGIPENNIS, Nordm.

Sterna longipennis, Nordm. in Erman's Verz. v. Th. u. Pfl. p. 17 (1835); Middendorff, Reise, Zool. p. 246, tab. 25. fig. 4 (1851); Schlegel, Mus. P.-B. *Sternæ*, p. 23 (1863) (as regards

Middendorff's specimens only, *H. S.*); Blas. J. f. Orn. 1866, p. 59; Gray, Hand-list, iii. p. 118 (1871).

In its slender shape and grey-tinted underparts this species seems to connect the preceding with *S. macrura*; the *feet*, however, are *brown*; and the *bill* is *black* in the breeding-season, and probably at other times. But authentic specimens in immature plumage are still desiderata, although I can refer to no other species a specimen obtained by Mr. Wallace in New Guinea. Lord Walden's collection contains a specimen from Yeso, the most northern of the Japanese islands; and thence it reaches as far west as Lake Baikal, where, as before observed, *S. tibetana* is also found; indeed many of the specimens sold by the Paris dealers as *S. longipennis* are really the latter species.

STERNA MACRURA, Naum.

Sterna hirundo (in part), Linn. Syst. Nat. p. 227 (1766), id. F. S. p. 55. no. 158; Gray, Hand-list, iii. p. 118 (1871); Sharpe & Dresser, B. Europe, xii. (1872).

Sterna macrura, Naum. Isis, 1819, p. 1847; Coues, P. Phil. Acad. 1862, p. 549; id. B. N.W. Am. p. 685 (1874).

Sterna arctica, Temm. Man. d'Orn. ii. p. 742 (1820).

Sterna brachypus, Swainson, B. W. Afr. ii. p. 152 (1837); Gray, Hand-list, iii. p. 118 (1871).

Sterna pikei, Lawr. Ann. Lyc. N. Y. vi. p. 3 (1853); id. Baird's B. N. Am. p. 853, pl. 95 (1858); Gray, Hand-list, iii. p. 118 (1871).

Sterna paradisea, Brünn., Schlegel, Mus. P.-B. *Sternæ*, p. 15 (1863); Blas. J. f. Orn. 1866, p. 74.

"*Sterna senegalensis*, Sw.," Schlegel, Mus. P. B. *Sternæ*, p. 16 (1863) (no. 1 sp. examined, *H. S.*).

Sterna portlandica, Ridg. Am. Nat. viii. p. 433 (1874); Coues, B. N.W. Am. p. 691 (1874). (Other unimportant synonyms are intentionally omitted).

It is true that the mere description of *Sterna hirundo* given by Linnæus suits the Arctic Tern as regards the colour of the bill, which is properly described as "rubrum," and as "coccineum" in the 'Faun. Suec.,' whereas in the Common Tern the red bill is somewhat tipped with horn-colour. In the references to former authors and in the context, especially where he says "habitat ubique ad lacus et stagna," there is, on the other hand, a stronger probability of Linnæus's bird being the Common Tern, a species abundant in Sweden, and which is far more in the habit of frequenting inland waters than the Arctic Tern. Since the time when the two species were discriminated, first by Naumann, and in the following year by Temminck, the names of *S. macrura* and *S. arctica* have been generally adopted for the Arctic Tern, the latter being, perhaps, the more widely recognized, until the late Mr. G. R. Gray, and afterwards Messrs. Sharpe and Dresser, in one of the early Parts of the 'Birds of Europe,' on which they were then jointly engaged, considered it advisable to shift the time-sanctioned name of *S. hirundo* from the Common to the Arctic Tern. There could be no objection to their discarding *S. hirundo* for the former and adopting *S. fluviatilis*; but these violent transfers must always be productive of confusion even when justifiable; and in this case it seems to me that the original description is so ambiguous that they would have done better to discard *S. hirundo* altogether, and to adopt the first name about which there could be no mistake—a step which, much as I dislike to differ from such high authorities upon nomenclature, I feel compelled to take.

This species is the *S. paradisea* of Brünnich (Orn. Bor. p. 42 (1764)—a pre-Linnæan name, which is not available. I notice it, however, because this name has frequently been employed for the Roseate Tern (*S. dougalli*), a bird with which Brünnich was unacquainted. From the plate and description I always imagined that *S. pikei* was an immature bird of this species, and am glad to have this opinion confirmed by Dr. Elliott Coues, who has lately reexamined the type.

With regard to *S. portlandica*, Mr. W. Brewer's investigations and the latest information from American sources leave little doubt that it is only an immature example of this species.

The Arctic Tern ranges along the coasts of northern Europe, Asia, and America; in winter it visits the African coast, descending as far as Walwich Bay; and I have an example obtained by Wucherer off Bahia, the only instauce known of its occurrence so far south on the American side; it is possible, however, that the bird mentioned by Philippi aud Landbeck, Cat. Av. Chilenas, 49 (1869), may be this species.

STERNA FORSTERI, Nutt.

Sterna hirundo, Sw. & Rich. F. Bor.-Am. p. 412 (1831), nec auct. (Saskatchewan River).

Sterna forsteri, Nuttall, Man. Orn. ii. p. 274, uote (1834); Lawr. B. N. Am. p. 862 (1858); Coues, P. Phil. Acad. 1862, p. 544; Blas. J. f. Orn. 1866, p. 74; Scl. & Salv. P. Z. S. 1871, p. 569; Gray, Hand-list, iii. p. 118 (1871); Coues, B. N.W. Am. p. 676 (1874).

Sterna havelli, Aud. Orn. Biog. v. (1839) p. 122, pl. 409. fig. 1, and of Lawr. &c. (*fide* Coues); Gray, Hand-list, iii. p. 118 (1871).

A rather stouter and larger species than *S. fluviatilis*, this species may always be distinguished by its having the *outer* webs of the long tail-streamers *white*, whereas in the allied species they are dusky. In the 'Birds of the North West' (*l. s. c.*) Dr. Coues gives the differential diagnoses of *S. forsteri*, *fluviatilis*, and *macrura*; and to these I have nothing to add.

In summer this Tern breeds in the interior of British America and in Wisconsin; but at other seasons it is generally distributed throughout the United States, and goes down as far as Guatemala, on both the Pacific and Atlantic side, and even to the latitude of Pernambuco, Brazil, thus nearly impinging upon the northern limits of *S. trudeaui*, a species to which, in *winter* plumage only, it bears a superficial resemblance.

STERNA DOUGALLI, Mont.

Sterna dougalli, Mont. Orn. Dict. Suppl. (1813); Vieillot, N. D. H. N. xxxii. p. 174 (1819), Gal. Ois. ii. p. 225; Steph. in Shaw's Gen. Zool. xiii. pt. i. p. 153 (1825); Scl. & Salv. P.Z.S. 1871, p. 571; Coues, B. N.W. Am. p. 688 (1874).

Sterna paradisea, Keys. & Blas. Wirb. Eur. p. 247. no. 484 (1840) (nec Brünn.); Lawr. B. N. Am. p. 863 (1858); Coues, Proc. Phil. Acad. 1862, p. 551; Gray, Hand-list, iii. p. 119 (1871); Walden, Ibis, 1874, p. 149 (Andaman Is.).

Sterna gracilis, Gould, P. Z. S. 1847, p. 222, B. Australia, vii. pl. 27 (1848), Handbook B. Austr. ii. p. 399 (1865); Gray, Hand-list, iii. p. 119 (1871).

"*Sterna douglasii*, Mont.," Schlegel, Mus. P.-B. *Sternæ*, p. 24 (1863).

"*Sterna douglasi*, Mont.," Blasius, J. f. Orn. 1866, p. 80.

? *Larus polo-candor*, Sparrm. Mus. Carl. ii. fasc. 4, no. 83 (1788). ("Habitat ins. Polo-candor, mari Chinensi.") The plate represents a very young Tern, apparently of this species. Bonaparte says (in his "Notes sur les Larides," in the Rev. et M. de Zool, 1854) that he has *proved* it to be a young *Rissa*! but any thing more unlike a Kittiwake it would be difficult to imagine.

Apart from its light and elegant shape and its proportionally short wings, this species may always be recognized by the white inner margins of the primaries, extending quite round the tips of the feathers as far as the outer webs; the rump and tail-coverts are washed with gray. The coloration of the bill varies considerably with age and seasons; in some specimens it is black almost to the base, whilst in others the red or orange extends far in front of the angle. In American specimens the bill is, perhaps, a trifle stouter than in British examples, which are in this respect identical with birds from Africa and the Indian Islands. In these the red colour gradually encroaches upon the black, until, in two specimens from the Andaman Islands, in Lord Walden's collection, the black at the tip of the bill has almost disappeared, in which state it becomes the *S. gracilis* of Mr. Gould, whose typical specimen in the British Museum is in *every* other respect identical with *S. dougalli* from any part of the world; indeed, in his original description (in P. Z. S. 1847, p. 222) Mr. Gould calls it "a very elegant species, closely allied to *S. dougallii* of the British Islands," although he omits that remark in the 'Birds of Australia.' In view of these gradual changes in the amount of black in the bill, as exemplified by a series of upwards of fifty specimens from various localities, I must consider *S. gracilis* merely a form of *S. dougalli* with more red in its bill than is usual in northern specimens.

I do not find authentic records of the occurrence of this bird beyond 57° N. lat., south of which it ranges in scanty numbers along the British and European coasts, and goes up the Mediterranean at least as far as the Balearic Islands, whence Canon Tristram possesses an adult obtained in May. I have not seen any specimens from the west coast of Africa, all those so marked from Damaraland being really *S. fluviatilis* in winter dress; but there are specimens in the British Museum from the Cape of Good Hope, and I have several examples from Natal. It is found off Rodriguez, and breeds at the Andaman Islands, where the eggs, sent with the parent birds by Capt. Wimberley, are far handsomer in markings than any American specimens; and quite recently I have received from Capt. Vincent Legge, R.A., a lovely rose-tinted specimen from Ceylon, shot in May, with but little black on the mandibles. Capt. Legge writes that a month later the red in the bills of the birds still on the coast had almost disappeared, showing what a changeable and untrustworthy character the colour of the bill is. From Ceylon this species is found throughout the Malayan islands down to Houtmann's Abrolhos, on the west coast of Australia.

In North America, where it is far more abundant than in Europe, it breeds from Massachusetts to Florida and at the Bermudas; also in Central America, and visits various West-Indian islands. In the British Museum is a skin registered as obtained at Taboga; and, the only place I know of that name being an island off Panama, this is a considerable extension of its range, if the locality can be trusted.

STERNA CANTIACA, Gm.

Sterna cantiaca, Gm. Syst. Nat. i. p. 606 (1788); Schl. Mus. P. B. *Sternæ*, p. 5 (1863); Layard, B. S. Africa, p. 370 (1867); Scl. & Salvin, P. Z. S. 1871, p. 569; Coues, B. N.W. Am. p. 673 (1874).

Sterna africana, Gm. Syst. Nat. i. p. 605 (1788), jr.

Sterna boysii, Lath. Ind. Orn. ii. p. 804 (1790).

Sterna canescens, Meyer & Wolf, Tasch. deutsch. Vög. ii. p. 458 (1810).

Thalasseus cantiacus, Boie, Isis, 1822, p. 563; Blas. J. f. Orn. 1866, p. 81.

Actochelidon cantiacus, Kaup, Sk. Entw. Eur. Thier. p. 31 (1829), type of *Actochelidon*.

Thalasseus canescens et *candicans*, Brehm, Vög. Deutsch. pp. 776, 777 (1831).

Sterna acuflavida, Cabot, Pr. Bost. Soc. ii. p. 257 (1847); Lawr. Birds B. N. Am. p. 860 (1858).

Thalasseus acuflavidus, Coues, Pr. Phil. Ac. 1862, p. 540.

Actochelidon cantiaca, Gray, Hand-list, iii. p. 119 (1871).

It is now generally admitted that the European and American birds are identical. The range of this species may therefore be broadly described as from Northern Europe to the Cape of Good Hope and the Bay of Bengal in winter, and along the Atlantic coast of North America to the West-Indian Islands, Honduras (probably its southern breeding-limit), and Brazil, at least as far as Bahia, whence I have a specimen.

STERNA ELEGANS, Gamb.

Sterna elegans, Gambel, Pr. Phil. Ac. iv. 1848, p. 129 (Mazatlan); Lawr. Birds N. A. p. 860 (1858).

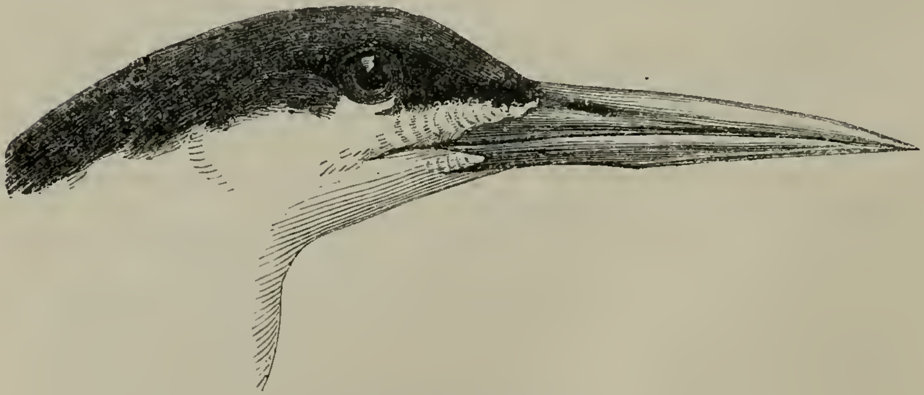
Thalasseus elegans, Gamb. Journ. Phil. Acad. ser. 2, vol. i. p. 228 (1849); Coues, Pr. Phil. Acad. 1862, p. 540; Ibis, 1864, p. 389 (San Salvador); Salvin, Ibis, 1866, p. 198 (Fonseca Bay).

Sterna comata, Phil. & Landb. Wieg. Arch. 1863, pt. 1, p. 126.

Sterna galericulata (part.), Scl. & Salv. P. Z. S. 1871, p. 569; Coues, Key, p. 319 (1872), B. N.W. Am. p. 671 (1874).

A recent examination of Lichtenstein's type of *S. galericulata* has shown it to be identical with the Cayenne Tern, *S. maxima*, Bodd.; so that Gambel's name must be restored. It occurs on the Pacific side of America, from the Gulf of California to the coasts of Peru and Chili; but I consider that the bird found on the Atlantic coast is distinct, although closely allied. Three specimens which I have examined in Mr. Salvin's collection, from the Pacific side, and two others in the British Museum, from Chili or Bolivia, all agree in having a longer foot and tarsus (·2 inch) than the Atlantic bird; but the principal distinction is in the bill; the angle of the lower mandible being well in advance of the front portion of the nostril (·5 inch diagonally) in the Pacific birds, whereas the angle is almost directly under the nostril in the Atlantic form; the colour of the bill also is red or orange in the former and yellow in the latter, even in tolerably fresh specimens, which still preserve the beautiful roseate tint of the underparts. It is perhaps as well to mention that these remarks are founded upon perfectly well-made skins, the tips of the mandibles being in their proper relative positions; otherwise it might be supposed that the under mandible had been unduly drawn back; the difference, however, on comparison, is very striking, as will be seen by the annexed woodcut.

Fig. 1.



Head of *Sterna eurygnatha*.

As the Atlantic bird has not hitherto been distinguished, I propose to call it

Sterna eurygnatha, sp. nov.

S. *similis* Sternæ eleganti, *sed rostro flavo et mandibulæ angulo sub narium apertura antica posito distinguenda.*

Similar to *S. elegans*, but a trifle smaller; bill less robust and yellow, whereas in *S. elegans* it is orange-red, the angle of the lower mandible almost immediately below the front of the nostril.

Sterna elegans, Leotaud, Ois. Trinidad, p. 542 (1866).

? "*Sterna cayanensis*, Gmel.," v. Pelzeln, Orn. Brasil. p. 323 (1871).

Range, from Santa Catharina, S. Brazil (*Rogers*), to the island of Trinidad, Leotaud's bird being most probably this species.

STERNA MEDIA, Horsfield.

Sterna media, Horsfield, Trans. Linn. Soc. 1820, xiii. p. 198 (type in E. I. Mus., examined, *H. S.*); Finsch & Hartl., Orn. Ost-Afr. iv. p. 830 (1870); Irby, Orn. Str. Gibraltar, p. 209 (1875).

Sterna affinis, Rüpp. (nec Horsf.) Atlas, p. 23. tav. 14 (1826) (Red Sea); Temm. Man. d'Orn. iv. p. 454 (1840) (Sicily); Schlegel, Mus. P.-Bas, *Sternæ*, p. 6 (1863); Degl. & Gerb. Orn. Eur. ii. p. 454 (1867).

Sterna bengalensis, Lesson, Tr. d'Orn. p. 621 (1831); Pucheran, Rev. Zool. 1850, p. 542; Jerdon, B. India, iii. p. 843 (1864).

Thalasseus torresii, Gould, P. Z. S. 1842, p. 140, B. Australia, vii. pl. 25 (1848).

Thalasseus bengalensis, Gould, Handbk. B. Australia, ii. p. 397 (1865).

Thalasseus affinis, Blas. J. f. Orn. 1866, p. 82.

Actochelidon affinis, Gray, Hand-list, iii. p. 119 (1871).

This species may be considered an eastern representative of the preceding; but it is slightly smaller, the mandibular angle more advanced, and can always be distinguished by its *pearl-grey rump and tail*. It ranges from the Straits of Gibraltar, along the Mediterranean, down the Red Sea to Madagascar, and eastwards along the Indian coast and islands, throughout the Malay archipelago, the Aru Islands, down to Torres Straits and Port Essington.

STERNA MAXIMA, Bodd.

Grande Hirondelle de Mer de Cayenne, Buffon, Ois. viii. p. 346.

Sterna maxima, Boddaert, Tabl. des P. Enl. p. 58. no. 988 (1783); Scl. & Salv. P. Z. S. 1871, p. 567 (Neotrop. Larid.).

Sterna cayennensis, Gmelin, Syst. Nat. 1788, i. p. 604; Leot. Ois. de Trinidad p. 535 (1866).

Sterna cayana, Latham, Ind. Orn. p. 804. no. 2 (1790); Steph. in Shaw's Gen. Zool. xiii. p. 155 (1825).

Sterna galericulata, Licht. Verz. Doubl. p. 81 (1823) (type in Berlin Mus., examined, *H. S.*); Pelzeln, Orn. Bras. p. 324 (1871); Schlegel, Mus. P.-B. *Sternæ*, p. 7 (1863).

Sterna erythrorynchos, Wied, Beitr. iv. p. 857 (1833); Tschudi, F. Per., Aves, p. 305 (1846).

Sterna cristata, Swains. B. W. Africa, ii. p. 247, pl. xxx. (1837) (type in Camb. Mus. examined, *H. S.*).

Thalasseus cayanus, Bp. List, 1838, p. 61; Gosse, B. Jamaica, p. 431 (1847).

Sterna regia, Gambel, Proc. Phil. Acad. iv. 1848, p. 228; Lawr. B. N. Am. p. 859 (1858); Coues, Key, p. 319 (1872), B. N.W. Am. p. 669 (1874).

Thalasseus regius, Gamb. J. Phil. Ac. i. 1849, p. 228; Coues, Proc. Phil. Ac. 1862, p. 539.

Phætusa regia, Bp. Compt. Rend. p. 772 (1856).

Thalasseus galericulatus, Blas. J. f. Orn. 1866, p. 82.

Thalasseus cayennensis, Gray, Hand-list, iii. p. 120 (1871); Shelley, Ibis, 1872, p. 293.

Sterna bergii, Irby, Orn. Str. Gib. p. 209 (1875) (coll. Lilford; sp. examined, *H. S.*).

I fully agree with Messrs. Sclater & Salvin that Buffon's plate on which *Sterna maxima* of Boddaert is founded, represents this species. Mr. Salvin and myself have also carefully compared Lichtenstein's type specimen of *S. galericulata* with our respective series of American specimens, and find them identical; I have also compared a good many specimens from the Gold Coast, all in winter plumage, and mostly obtained in the early spring. The specimen in Lord Lilford's collection, which was obtained by the late M. Favier in the Straits of Gibraltar, and was purchased from his successor by Col. Irby, undoubtedly belongs to this species.

Some North-American examples are a trifle more robust in the bill than either Brazilian or African specimens; but there is no constant difference, even in this particular.

On examining Lichtenstein's type of *S. galericulata*, the outer primaries proved to be partially in the sheath, and about two inches shorter than their natural length, explaining the original description of "the tail being 2 inches longer than the wings" which had previously been a great puzzle, there being no Tern of this size known in which the proportions were such. This species has a somewhat wide range, as it is found on the Pacific coast from California to Peru, whilst on the Atlantic sea-board it has once occurred as far north as Massachusetts; it breeds on the coast of Florida, and on some of the cays of the West-Indian Islands, and visits South Brazil. Its occurrence on the African coast has already been noticed; but at present there is no record of its breeding there.

STERNA CASPIA, Pall.

Sterna caspia, Pall. Nov. Comm. Petrop. xiv. p. 582 (1769–70); Pall. Zoog. Rosso-As. p. 332 (1811).

Sterna tschegrava, Lepechin, Nov. Comm. Petrop. xiv. p. 500 (1769–70).

Sterna caspica, Sparrm. Mus. Carl. ii. fasc. 3, no. 72 (1788); Kirk, Ibis, 1864, p. 337 (mouth of Zambesi, breeding).

Sterna megarhynchos, Meyer & W. Tasch. deutsch. Vög. ii. p. 457 (1810).

Thalasseus caspius, Boie, Isis, 1822, p. 563; Coues, Proc. Phil. Acad. 1862, p. 538, and *T. imperator* in text; Gray, Hand-list, iii. p. 120 (1871).

Hydroprogne caspica, Kaup, Sk. Entw. eur. Thier. p. 91 (1829).

Sylochelidon caspia, Brehm, Vög. Deutsch. p. 770 (1831), type of *Sylochelidon*; Blas. J. f. Orn. 1866, p. 82; Gould, Handbk. B. Austr. ii. p. 392 (1865).

Sylochelidon balthica et *S. schillingii*, Brehm, Vögel Deutsch. p. 769, 770 (1831).

Helopus caspius, Wagler, Isis, 1832, p. 1224 (type of *Helopus*).

Thalassites melanotis, Swain. B. W. Af. ii. p. 253 (1837) (type in Camb. Mus. examined, *H. S.*).

Sylochelidon strenuus, Gould, P. Z. S. 1846, p. 21; Gould, B. Austr. vii. pl. 22 (1848).

Sylochelidon melanotis, Bp. Compt. Rend. 1856, p. 772.

Sterna melanotis, Hartl. Orn. West-Afr. p. 254 (1857).

Sterna major, Ellman, Zool. 1861, p. 7472.

This large and well-known Tern is found from Northern Europe to New Zealand, and in America from Labrador, where it breeds, down to New Jersey. Mr. Bernard Ross also found it as far west as Great Slave Lake and the Mackenzie river.

It is now generally conceded that there is but one species.

With regard to the name, Dr. Elliott Coues very justly remarks that it is undesirable to adopt Lepechin's cacophonous name, in place of the well-known one given by Pallas, merely on the score of a priority of 82 pages.

STERNA BERNSTEINI, Schlegel.

Sterna bernsteini, Schlegel, Mus. P.-B. *Sternæ*, p. 9 (1863) (♂, winter E. coast of Halmahera; type in Leyden Mus. examined, *H. S.*).

Thalasseus bernsteini, Blas. J. f. Orn. 1866, p. 81.

This large and very light-coloured species, the mantle being even paler than in *S. cantiaca* or *S. maxima*, is classed by Prof. Schlegel amongst the group which has the white frontlet band in the breeding-plumage. This may be the case; but I can discern no proof of it in the type and only specimen in the Leyden Museum, nor in two others from the Island of Rodriguez in the British Museum, nor in two others from Round Island and Ile de la Baleine, in the collection of Messrs. A. & E. Newton; for all these, the only ones I have ever seen, are equally in winter dress. The bill is yellow; but the black at the apex in the type is probably an individual peculiarity.

This Tern is closely allied to *S. maxima*; and, until we obtain a specimen in full plumage, its place seems to be next to it in order. The dimensions are:—Wing 12·5 to 13 inches; tarsus 1·1; foot, including middle claw, 1·15; bill 1·8.

STERNA BERGII, Licht.

Sterna bergii, Licht. Verzeich. p. 80 (1823), South Africa (type in Berlin M. examined, *H. S.*); Schlegel, Mus. P.-Bas, *Sternæ*, p. 11 (1863); Finsch & Hartl. Vög. Ost-Afr. p. 828 (1870); Shelley, B. of Egypt, p. 298 (1872).

Sterna cristata, Steph. in Shaw's Gen. Zool. xiii. pt. i. p. 146 (1825) (nec Swainson); Swinhoe, Ibis, 1860, p. 68, 1863, p. 30.

Sterna velox, Rüpp. Atlas, p. 21, t. 13 (1826), Red Sea (type at Frankfort examined, *H. S.*); Thomson, Nat. Hist. Ireland, iii. p. 226 (1847), "between Dublin and Howth, end of Dec. 1846, in full breeding-plumage" (!); Swinhoe, Ibis, 1860, p. 429, 1861, p. 345, 1866, p. 134; Kirk, Ibis, 1864, p. 339 (breeding at mouth of Zambesi).

Sterna pelecanoides, King, Surv. Int. Austr. ii. p. 422 (1826).

Sterna longirostris, Lesson, Traité d'Orn. p. 621 (1831); Pucheran, Rev. Zool. 1850, p. 635; Boie, Isis, 1844, p. 181.

Pelecanopus pelecanoides, Wagler, Isis, 1832, pp. 277 & 1225, type of *Pelecanopus*.

Thalasseus pelecanoides, Gould, B. Austr. vii. pl. 23 (1848); Gray, Gen. Birds, iii. p. 658; Swinhoe, P. Z. S. 1871, p. 422.

Thalasseus poliocercus, Gould, B. Austr. vii. pl. 24 (1848), Handbk. B. Austr. ii. p. 396 (1865).

Sterna rectirostris, Peale, Zool. U.S. Expl. Exped. p. 281 (1848).

Sylochelidon polyocerca, G. R. Gray, List of *Anseres*, Brit. Mus. p. 175.

Sterna novæ-hollandiæ (Mus. Paris.), Pucheran, Rev. Zool. 1850, p. 545 (type in Paris Mus. examined, *H. S.*)

Pelecanopus velox, *P. bergii*, et *P. poliocercus*, Bonap. Compt. Rend. xlii. p. 772 (1856).

Sterna poliocerca, Schlegel, M. P.-Bas, *Sternæ*, p. 12 (1863); G. R. Gray, Ibis, 1862, p. 249.

Thalasseus cristatus, Swinhoe, P. Z. S. 1863, p. 329; Jerdon, B. of India, iii. p. 842 (1864); Gould, Handbk. B. Austr. ii. p. 394 (1865).

Thalasseus bergii, Blas. J. f. Orn. 1866, p. 81.

"*Phætusa astrolabæ*, Bp." in Paris Mus. from Tonga-tabu, Voy. of Quoy & Gaimard. Another specimen so marked = *S. frontalis*—*H. S.*

The distinguishing character of this large Sea-Tern is the white band of feathers across the base of the bill. In the adult plumage, and even in winter plumage, there is no other species of its size in which the mantle and tail are of so dark a grey; but it must be admitted that between extreme individuals from different localities there is a considerable difference in intensity of coloration. In a series, however, they blend so gradually as to make it impossible to draw a line; whilst with regard to the smaller race, which has received the name of *S. poliocerca*, there are similar imperceptible gradations in size. The types, of *S. bergii* from the Cape of Good Hope and of *S. velox* from the Red Sea, are identical in size and colour, and are not perceptibly lighter in colour than "*S. pelecanoides*;" but in Madagascar specimens, and also in some from Damara-land, the mantle is of a lighter shade. Locality does not assist in separating them; for it is clear that the light- and the dark-backed birds cross each other's line at Madagascar.

From the Cape of Good Hope and from the Red Sea (with the exception of Madagascar), throughout the Indian Seas, Ceylon, the Malay archipelago, the China seas, down to Australia and the Fiji group, we find a uniformly dark mantle and tail; but at Ceylon we begin to meet with a race which differs in no respect but that of size, and this by imperceptible gradations. I must therefore follow Messrs. Finsch & Hartlaub, and unite these three varieties under one head. Before coming to this conclusion, I have examined about 70 specimens, and must especially acknowledge the great assistance I have received from the fine series of sexed and dated specimens sent to me from Ceylon by Capt. V. Legge, R.A. It is at Ceylon that the two races seem to unite, large and small examples occurring throughout the year in the same locality and flocks; and the difference thus becomes reduced to one of mere individual peculiarity. A series of measurements show that in length of wing (14 inches) and general dimensions, some Australian specimens are fully equal to the largest African ones; Polynesian examples are somewhat smaller, and there is less of a brown tinge in the colour of the back. This Tern appears to range as far as the Sandwich Islands; but I have not seen specimens.

The description given by Thompson, in the 'Birds of Ireland,' of the bird killed between Howth and Dublin undoubtedly applies to this species; but it is to be regretted that he did not see it *in the flesh*, as the fact of the specimen having the black head and white frontlet band (the mark of the *fullest breeding-plumage*) at the end of *December*, is somewhat remarkable. I learn from Mr. A. G. More, of the Dublin Museum, that this specimen is no longer in existence, having been burned with the rest of Mr. Walter's collection many years ago.

STERNA FRONTALIS, Gray.

? *Sterna striata*, Gm. Syst. Nat. i. p. 609 (1788): *Striated Tern*, Lath. Syn. iii. 2, p. 358, pl. 98—New Zealand (from a drawing by Sir J. Banks), jr.

Sterna velox, Gould (nec Rüpp.), P. Z. S. 1842, p. 140.

Sterna frontalis, Gray, Voy. Erebus & Terror, p. 19 (1844); Hand-list, iii. p. 118 (1871); Buller, B. New Zealand, p. 281 (1873).

Sterna albifrons, Peale, U.S. Expl. Exp. Birds, p. 279 (1848).

Sterna melanorhyncha, Gould, B. Australia, vii. pl. 26 (1848)—Van Diemen's Land; id. Handbk. B. Australia, ii. p. 398 (1865); v. Pelzeln, Orn. Novara-Reise, p. 154 (1865); Gray, Hand-list, iii. p. 118 (1871).

Sterna atripes, Ellman, Zoologist, 1861, p. 7473.

Sterna longipennis, Finsch (nec Naum.), J. f. Orn. 1867, p. 339.

"*Phætusa astrolabæ*, Bp.," specimen in the Paris Mus. from Tongatabu, Quoy & Gaimard's Voy., is a young bird; but another bird from same locality and similarly named = *S. bergii*!—*H. S.*

After comparing an immature specimen of this species with Latham's plate of the Striated Tern from New Zealand, I have no doubt in my own mind that this was the bird he figured; but it must be admitted that the drawing and description would almost equally suit the young of the Sandwich Tern; and *S. striata*, Gm., has in consequence been generally referred to that species. On the other hand there can be no possible doubt as to the identity of Gray's description, accompanied as it is by a plate of the *adult* bird. I think, therefore, that it is desirable to retain the name of *S. frontalis*, in preference to making a change which might be considered arbitrary, and would certainly be productive of temporary confusion.

In the white border to the inner webs of the primaries this Tern resembles *S. dougalli*, as remarked by Mr. Gould; it is, however, larger than that species, although not equal in size to *S. cantiaca*; and the white frontal band and black bill will always serve to distinguish it.

It appears to be a true Sea-Tern, breeding, according to Mr. Buller, in large colonies, and depositing its single egg on the bare rock, close to high-water mark. I have not seen specimens of the eggs; but, from the description, they seem to approach those of *S. cantiaca* in their general character.

Under the name of *S. melanorhyncha*, Mr. Gould records the occurrence on the coast of Tasmania of a Tern which appears to be identical with this species; but with that exception it does not seem to leave the shores of New Zealand.

STERNA TRUDEAUII, Audubon.

Sterna trudeauii, Aud. Orn. Biog. v. p. 125; id. B. Am. vii. p. 105 (1844); Lawr. B. N. Am. p. 861 (1860); Schl. Mus. P.-B. *Sternæ*, p. 29 (1863); Gray, Hand-list, iii. p. 118 (1871); Scl. & Salv. P. Z. S. 1871, p. 570 (Neotrop. Lar.); Landb. An. Univ. Chile, 1872, p. 515; Coues, B. N.W. Am. p. 675 (1874).

Phætusa trudeauii, Blasius, J. f. Orn. 1866, p. 73.

Sterna frobeenii, Ph. & Landb. Wieg. Arch. 1863, p. 125; Cat. Av. Chil. p. 49 (fide Scl. & Salv.); Landbeck, An. Univ. Chile, 1872, p. 515; Gray, Hand-list, iii. p. 118 (1871).

This well-marked species is similar in size, shape of bill, and general plumage to *S. forsteri* in winter dress; but, unlike the majority of Terns, it *never has the crest black*, the crown being pure white, with only a transocular line on each side of the head; the mantle, wings, and tail are light grey; the rump white, and the feet yellow. It occurs along the coast of South Brazil and the Argentine provinces, and also on that of Chili; but of its breeding-places and eggs nothing is yet known; indeed, until lately, even skins were extremely rare in collections.

Messrs. Sclater & Salvin and Dr. E. Coues are doubtful as to the type of this species having been really obtained on the coast of New Jersey—a doubt in which I share; but there is now no means of disproving Audubon's statement. With regard to *S. frobeeni*, which Messrs. Sclater and Salvin identified with this species, Mr. L. Landbeck, in the 'Anales de la Universidad de Chile,' maintains their distinctness, and gives an elaborate comparative description of each, the result of which is, to my mind, to show more clearly than ever that his *S. frobeeni* is merely the present bird in immature plumage.

STERNA MELANAUCHEN, Temm.

Sterna melanauchen, Temm. Pl. Col. v. pl. 427 (1838?); Gould, B. Austr. vii. pl. 28 (1848); Schlegel, Mus. P.-B. *Sternæ*, p. 28 (1863); Finsch & Hartl. B. Central Polyn. p. 224 (1867).

Onychoprion melanauchen, Blyth, Cat. Birds Mus. As. Soc. p. 293 (1849); Jerdon, B. India, iii. p. 844; Swinhoe, Ibis, 1867, p. 230; id. P. Z. S. 1871, p. 422 (Amoy); Walden, Ibis, 1874, p. 149.

Sternula melanauchen, Bp. Compt. Rend. xli.; Blasius, J. f. Orn. 1866, p. 74; Gray, Hand-list, iii. p. 121 (1871).

Sterna marginata, Blyth (*fide* Jerdon), juv.

Gygis, sp? et *Gygis decorata*, Hartlaub, Ibis, 1864, p. 232; Godeffroy's Cat. i. (1864) p. 5.

In this species the feet are strong and fully webbed; but I see no reason for separating it from true *Sterna*. It ranges from the Andaman and Nicobar Islands, throughout the Malay archipelago, and up the China coast to Amoy, down to the northern coasts of Australia, New Caledonia, and as far as the Fiji group. The eggs, specimens of which I owe to the kindness of Capt. Wimberley stationed at the Andaman Islands, are two in number, and are of a clay-white ground-colour, minutely spotted with brown of various shades; in some varieties the ground-colour is nearly pure white.

We now come to a group for which, making *S. minuta* his type, Boie proposed the genus *Sternula*—one which I regret to be unable to adopt, owing to the absence of any structural distinctions; for in some respects it is a very convenient subdivision, and the name explains itself.

There are four forms of small Tern with white forehead and black lores, the distinguishing features of which have frequently been overlooked, and various species thereby confounded. It is difficult to give the exact range of each; for the young are not always to be recognized with facility. But the characters of the adults may be briefly enumerated.

STERNA MINUTA, Linn.

Sterna minuta, Linn. Syst. Nat. i. p. 228 (1766), et auct.

Sternula minuta, Boie, Isis, 1822, p. 564, type of *Sternula*.

Other synonyms are unimportant and need not be given here.

This Tern, which has *dark* shafts to the outer primaries, and the rump and tail *white*, ranges throughout temperate Europe to India, occurs in winter on coast of West Africa as far as the Cape of Good Hope, whence there is a specimen in the British Museum.

STERNA ANTILLARUM, Less.

Sterna antillarum, Lesson, Desc. Mamm. et Ois. p. 256 (1848); Coues, Proc. Phil. Acad. 1862, p. 552; Scl. & Salv. P. Z. S. 1871, p. 571.

Sterna argentea, Nutt. Man. ii. p. 280 (1834); Léotaud, Ois. Trinidad, p. 545; Wied, Beit. iv. p. 871 (1833); Burm. Syst. Uebers. iii. 542; Pelz. Orn. Bras. p. 325.

Sterna frenata, Gamb. Proc. Phil. Ac. 1848, p. 128.

Sterna superciliaris, Cab. J. f. Orn. v. 232; Coues, Key, p. 332 (1872).

Sterna superciliaris, var. *antillarum*, Coues, B. N.W. Am. p. 692 (1874).

Similar to the above, and has also *dark* shafts to primaries; but *the rump and tail-coverts are pearl-grey* like the mantle, and there is but little black at tip of bill.

Ranges throughout temperate America, on both coasts, and down to the Antilles, Trinidad, lat. 10° N.

STERNA SUPERCILIARIS, Vieill.

Sterna superciliaris, Vieillot, N. D. xxxii. p. 126 (1819), based on the *Hati ceja blanca* of Azara; Scl. & Salv. P. Z. S. 1871, p. 571; Coues, B. N.W. Am. p. 692 (1874), in part.

Back, rump, and tail slightly darker than in the above; bill stouter and entirely yellow; the legs and feet also are of an olivaceous colour in my Amazon specimens, very different from the bright yellow of those parts in the two foregoing*.

Is found on all the large South-American rivers from the Parana upwards, is plentiful on the Amazons and the Ucayali, and I found it abundant on the river Huallaga still further west.

STERNA SINENSIS, Gm.

Sterna sinensis, Gm. Syst. Nat. i. p. 608 (1788), based on the Chinese Tern of Latham.

Sterna minuta, Horsf. Trans. Linn. Soc. 1820, xiii. p. 198.

Sternula sinensis, Swinhoe, Ibis, 1863, p. 430; id. P. Z. S. 1863, p. 329.

Sternula minuta, Swinhoe, P. Z. S. 1871, p. 422 (Formosa and China).

Sternula placens, Gould, Ann. Nat. Hist. viii. p. 192 (1871); id. B. New Guinea, pt. iii. pl. 7 (May 1876).

Like *S. minuta*, but *shafts* of outer primaries *white*; as a rule also the bird is a trifle larger and stouter, and has a longer development of lateral tail-feathers than *S. minuta*.

Ranges from Ceylon, where it breeds, to the China seas, to Queensland, and down the Australian coast; how far I cannot say, as I have no specimens from there with trustworthy localities. From Ceylon Capt. Vincent Legge, R.A., has sent me a fine series, with the eggs, which are, as might naturally be expected, like those of *S. minuta*. He also sent me a nestling with the outer quill-feathers only partially developed; and on comparing it with a

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* Dr. Coues (B. of N.W. Am. p. 694) distinguishes *S. antillarum* from *S. minuta* by its grey rump and smaller bill with little black at the tip; but he goes on to argue that because it has sometimes no black at all on the bill, as is the case with *S. superciliaris*, which has, in its turn, a bill as stout or stouter than *S. minuta*, therefore *S. superciliaris* and *S. antillarum* are to be united. I fail to see how he can consistently do this without putting *all* the small Terns under one head; for the stout bill, especially so from the angle to the tip, and the abrupt prolongation of the outer tail-feathers in *S. superciliaris*, to say nothing of coloration, suffice to distinguish it from any other member of the group.

S. minuta of the same age, the difference in the colour of the shafts of the primaries was very apparent. There is often a grey tint on the rump and tail-coverts of winter-killed and immature specimens.

STERNA SUMATRANA, Raffl.

Sterna sumatrana, Raffles, Trans. Linn. Soc. xiii. (1822) p. 329.
Sterna pusilla, S. Müller (*fide* Gray)—Timor and Java.

Bill smaller and more slender than even in *S. antillarum*, but with much black between the angle and tip; tail-coverts and tail *grey as in the back*; shafts of primaries *black*.

Captain V. Legge has sent me a nearly adult specimen of this Tern from Ceylon; and the fact of two such different forms as this and the preceding being met with there is somewhat remarkable; a similar specimen is in my collection, from the coast of Fantee. Lord Walden has a specimen from Zoulla, Red Sea, obtained by Mr. W. Jesse; and that is all I know about this small dark form of the group, which is even darker than *S. antillarum* on the rump and tail, and has also a good deal more black on the bill. I have adopted Raffles's name for it, because the description and locality seem to fit it fairly; and, in default of a larger series, I do not wish to incur the odium of making species upon slight grounds.

STERNA NEREIS (Gould).

Sternula nereis, Gould, P. Z. S. 1842, p. 140, B. Australia, vii. pl. 29 (1848)—Bass's Straits and West Australia.
Sterna parva, Ellman, Zoologist, 1861, p. 7473.
Sterna nereis, Pelzeln, Verh. zool.-bot. Gesellsch. Wien, xxii. p. 318 (1867); Buller, B. New Zeal. p. 285 (1873).
Sterna minuta, Finsch, J. f. Orn. 1867, pp. 337, 347.
Sterna alba, Potts, Trans. N.Z. Inst. 1870, p. 106.

This species, which appears to be confined to Australia and New Zealand, may be distinguished from the other small Terns by its somewhat larger size, the paler grey of the mantle and especially of the primaries, and by its having *no black lores*, but only a dark *spot* in front of the eye. In the young the distinction is not so easy; but the primaries are always lighter than in *S. minuta* or *S. sinensis*.

STERNA EXILIS, Tsch.

Sterna exilis, Tschudi, F. Per., Aves, p. 306 (1846); Sclater, P. Z. S. 1867, pp. 336 & 344; Scl. & Salv. P. Z. S. 1871, p. 572.
Sterna lorata, Ph. & Landb. Wieg. Arch. 1863, pt. i. p. 124.
Sternula loricata (!), Gray, Hand-list, iii. p. 121 (1871).

The general smoke-grey of the under as well as the upper parts, and the large amount of black on the bill, will always serve to distinguish this species, of which I have only seen two specimens—one in Messrs. Salvin and Godman's collection, and one in the British Museum. Both these are from the coast of Peru and Chili; but of its breeding-places we know nothing at present.

STERNA BALÆNARUM (Strickl.).

Sternula balænarum, Strickl. Contr. Orn. 1852, p. 160; Gurney, Andersson's B. Damar. p. 363 (1872).

In this species there is no white frontlet, the black feathers coming down to the base of the bill, which is slender and black, except at the gape; the tail is grey like the mantle; and the tarsi and feet are the smallest of those of the group. The shafts of the primaries are *white*.

Walwich Bay to the Cape of Good Hope is its range, so far as is known.

STERNA ALEUTICA, Baird.

Sterna aleutica, Baird, Tr. Chicago Acad. 1869, 321, pl. 31. fig. 1 (Alaska); Dall & Bann. ib. p. 307; Coues, Key to N.-Am. B. p. 322 (1872), B. of N.W. Am. p. 696 (1874); Gray, Hand-list, iii. p. 118 (1871).

After a careful examination of Pallas's description of *Sterna camtschatica*, I fully agree with Dr. E. Coues that Dr. O. Finsch has no sufficient reason for identifying it with this species (Abh. nat. Ver. Bremen, iii. p. 85). It is needless to repeat here the excellent descriptions given by the above American authors, the last of whom informs us that since the acquisition of the type three more specimens have been obtained. With its head-markings similar to those of the Sooty Tern (*Sterna fuliginosa*), from which, again, it differs in having a *white rump and tail*, it certainly presents a most interesting link in coloration between the Sooty and the typical Terns, groups which I cannot separate generically for want of well-defined structural differences. Indeed Dr. Coues seems inclined to give up *Haliplana* as a genus; and as the only distinction appears to be in the coloration, it is not easy to see how it can be retained according to the modern definition of a genus. The type was obtained at Kadiak, Alaska, in June, with the egg; so that it was in full breeding-plumage; but of the immature stages we have as yet no description.

STERNA ANÆSTHETA (Scop.).

Sterna anæthetus (sic), Scop. Del. Faun. et Flor. Ins. i. p. 92. no. 72 (1786), ex Sonn. Voy. p. 125, pl. 84.

Sterna panayensis, Gm. S. N. ii. p. 607 (1788).

Sterna oahuensis, Bloxham, Voy. 'Blonde,' p. 251 (1826).

Haliplana panayensis, Wagler, Isis, 1832, p. 1224; Salvin, Ibis, 1864, p. 381, 1866, p. 199; Blas. J. f. Orn. 1866, p. 80.

"*Sterna antarctica*, Cuv.," Lesson, T. d'Orn. p. 621 (1831); Pucheran, Rev. Zool. 1850, p. 541. (Admitted to be *S. panayensis*.)

Onychoprion panaya, Gould, B. Austr. vii. pl. 33 (1848).

Sterna infuscata, Heugl. Ibis, 1859, p. 351; id. F. Roth. Meeres, p. 32.

Sterna panaya, Heugl. F. Roth. Meeres, p. 31; Finsch & Hartl. Vög. Ost-Afr. p. 833 (1870).

Onychoprion panayensis, Scl. & Salv. P. Z. S. 1871, p. 572.

Haliplana discolor, Coues, Ibis, 1864, p. 392; Elliot, B. N. Am. ii. pl. 57 (1869).

? *Hydrochelidon somalensis*, Heugl. Orn. N.O.-Afr. p. 1458, p. ccvii (1873).

Haliplana anosthætus, Gray, Hand-list, iii. p. 122 (1871).

Sterna melanoptera, Swainson, B. W. Afr. ii. p. 249 (1837) (type in Camb. Mus. examined, *H. S.*).

This species, originally described from the Philippine Islands, is somewhat smaller than *S. fuliginosa*; the colour of the mantle is also less intensely dark. But the principal distinction is found in the feet, in which the webbing, instead of coming down to the claws between the outer and middle toe as in *S. fuliginosa*, only descends to the last joint, showing a more important structural difference between two such closely allied species than there is between *Onychoprion* and typical *Sterna*—an additional reason for discarding the former genus and its synonyms. The drawings show the shape of the feet in both species.

Fig. 2.

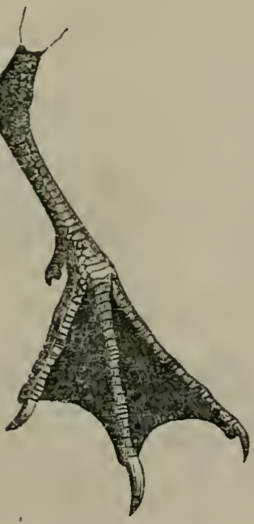


Fig. 2. Foot of *Sterna fuliginosa.*

Fig. 3.

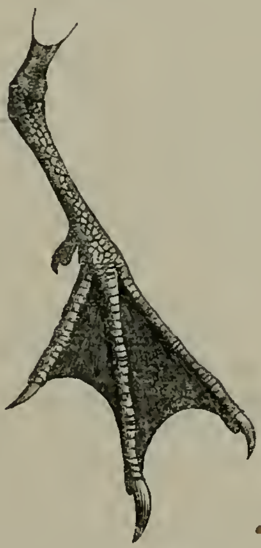


Fig. 3. Foot of *Sterna anæstheta.*

In the young of the present species the *underparts* are *light-coloured* on emerging from the downy stage, whereas in *S. fuliginosa* they remain dark for some time.

Its range appears to be nearly identical with that of *S. fuliginosa*, and is noticed under that head.

STERNA LUNATA, Peale.

Sterna lunata, Peale, U.S. Expl. Exp., Birds, p. 277 (1848); Cassin, U.S. Expl. Exp., Birds, p. 382 (1858); Schlegel, Mus. P.-

B. *Sternæ*, p. 27 (1863); Finsch & Hartl. F. Centralpolyn. p. 231, pl. xiii. fig. 3 (1867).

Haliplana lunata, Blas. J. f. Orn. 1866, p. 80; Gray, Hand-list, iii. p. 122 (1871).

This species is rather larger than the preceding; but the webs of the toes are similarly incised; the general colour is much greyer. Its range appears to be somewhat restricted, extending from the Moluccas to the Phenix and the Paumatu groups of the Polynesian Islands. There are no specimens in the British Museum; but I have examined those at Leyden, and find it a well marked species.

STERNA FULIGINOSA, Gm.

Sterna fuliginosa, Gm. Syst. Nat. i. p. 605 (1788); Aud. B. N. Am. vii. p. 90, pl. 432 (1840); Temm. & Schl. Fauna Japonica, p. 133, pl. 89 (1842); Lawr. B. N. Am. p. 861 (1858); Cassin, Orn. U.S. Expl. Exp. p. 386 (1858); Finsch & Hartl. Orn. Centralpolyn. p. 225 (1867), Vög. Ost-Afr. p. 831 (1870); Harting, Brit. Birds, p. 169 (1872).

Onychoprion fuliginosus, Wagler, Isis, 1832, p. 277 (type of genus *Onychoprion*, based on *S. serrata* of J. R. Forster's MS. Descr. An. p. 276, ed. Licht. 1844); Gould, B. Australia, vii. pl. 32 (1848); Sclater, P. Z. S. 1856, p. 144 (I. Ascension); Scl. & Salv. P. Z. S. 1871, p. 573.

Planetis guttatus, Wagler, Isis, 1832, p. 1222 (type of genus *Planetis*, based on *S. guttata* of J. R. Forster's MS. Desc. An. p. 211, ed. Licht. 1844).

Haliplana fuliginosa, Wagl. Isis, 1832, p. 1224 (type of genus *Haliplana*); Bp. Compt. Rend. 1856, p. 772; Coues, Pr. Phil. Acad. 1862, p. 556; id. B. N. W. Am. p. 698 (1874); Gray, Hand-list, ii. p. 122 (1871).

Sterna infuscata, Licht. Verz. Doubl. p. 81 (1823) (type in Berlin Mus. examined, *H. S.*).

Anous l'herminieri, Lesson, Desc. Mamm. et Ois. p. 255 (1847).

Sterna gouldii, Reichenbach, Schwimmvög. Supp. xii. fig. 829.

Sterna luctuosa, Phil. & Landb. Wiegm. Arch. p. 126 (1866).

Thalassipora infuscata, Gray, Hand-list, iii. p. 122 (1871).

"*Haliplana fuliginosa*, var. *crissalis*, Baird," Lawr. (Grayson) Proc. Bost. N.H. S. 1871, p. 285.

It will be observed that Wagler has based no less than three genera upon this single species—the first, *Onychoprion*, depending upon a supposed serration of the claw, evidently due to natural causes in the specimen he had before him, while the other two genera are based upon the slightest of structural differences. I confess I cannot see any good reason for erecting it into a genus, especially in view of the connecting-link formed by the preceding species.

Both this species and *S. anæstheta* range throughout the whole of the warmer portions of the world, there being no perceptible difference between individuals from the most widely separated localities. It is said that at Ascension Island the Sooty Terns, or

"Wideawakes," come every eight months to breed; if true, this is somewhat remarkable. The foot of this species is webbed to the extremity of the toes, as shown in the drawing (p. 665). The young are *dark* on the *underparts*.

Genus NÆNIA, Boie.

NÆNIA INCA (Lesson).

Sterna inca, Lesson, Voy. 'Coquille,' ii. p. 731. no. 145, atlas pl. 47 (1826).

Anous inca, Gray, Gen. Birds, iii. p. 661 (1849); Blas. J. f. Orn. 1866, p. 83.

Nænia inca, Boie, Isis, 1849, p. 189 (type of genus *Nænia*); Bp. Compt. Rend. xlii. p. 773 (1856); Scl. and Salv. P. Z. S. 1871, p. 567 (Neotrop. Laridæ); Gray, Hand-list, iii. p. 123 (1871).

Larosterna inca, Blyth, Cat. Mus. As. S. p. 293 (1849), type of *Larosterna*.

Inca mystacalis, Jard. Contrib. Orn. 1850, p. 32; Cassin, U.S. Expl. Exp. p. 391 (1858).

Anous inca, Gray, Gen. Birds, iii. p. 661 (1849)

Inca mysticalis, Jardine, Contr. Orn. 1850, p. 32; Cassin, U.S. Expl. Exped. p. 391 (1858)—Callao.

This well-marked form seems fairly entitled to generic distinction, the white drooping plumes beneath the eye, and the wattled gape being found in no other species: the hallux is also connected with the foot by a rudimentary web; the tail, however, is forked as in typical *Sternæ*, removing it from any close relationship to *Anous* where some have placed it. It appears to be a rock-breeding species confined to the coasts of Peru and Chili.

Genus GYGIS, Wagler.

GYGIS CANDIDA (Gm.).

? *Sterna alba*, Sparr. Mus. Carls. ii. fasc. i. No. 11 (1786); Gm. Syst. Nat. i. 2, p. 607 (1788); J. R. Forster, Descr. An. p. 179, ed. Licht. (1844).

Sterna candida, Gm. Syst. Nat. i. 2, p. 607 (1788).

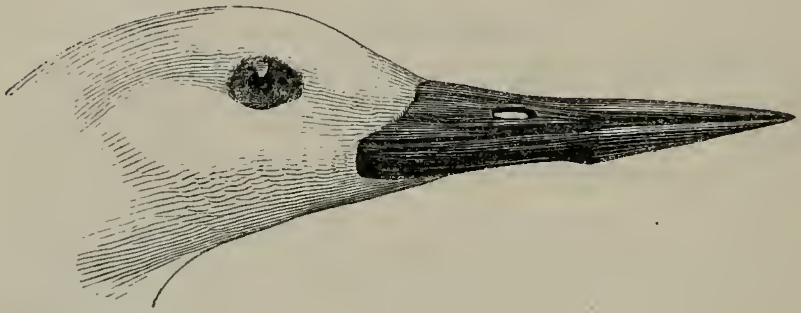
Gygis candida, Wagler, Isis, 1832, p. 1223, ex J. R. Forster, MS. (type of *Gygis*); Gray, Gen. Birds, iii. p. 660 (1849); Gould, B. Australia, vii. pl. 30 (1848).

Gygis alba (Sparr.), Cassin, U.S. Expl. Exp. p. 389 (1858); Blasius, J. f. Orn. 1866, p. 73; Finsch & Hartl. Faun. Centralpolynes. p. 232 (1867); Gray, Hand-list, iii. p. 122 (1871).

This beautiful and peculiar species is characterized by long slender toes with very deeply incised webs, and a graduated tail, approaching in shape that of the next genus, *Anous*. The shape of the bill is also peculiar, being broad at the base, and slightly tapering upwards in front of the mandibular angle. To this form have belonged all the examples which I have examined, or the descriptions of which I have compared, from Madagascar and throughout Polynesia until we reach the

Marquesas. From that group, apparently the outpost of the species, I have examined three specimens, which differ so remarkably from all others that I cannot consider them mere varieties, and propose for them the name of

Fig. 4.



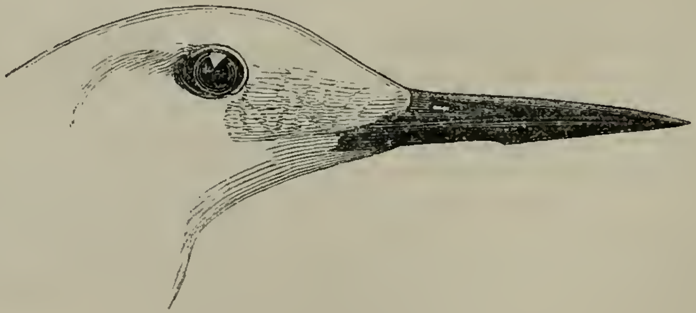
Head of *Gygis candida.*

Gygis microrhyncha, sp. nov.

Alba: similis G. candidæ, *sed minor, rostro multo minore tenuiore, rectricum scapis albis nec nigris, distinguenda.*

In length of wing it is nearly an inch shorter than *G. candida*; the tail-feathers are more rounded, and the 3rd is the longest, whereas the 2nd is the longest in the larger species: the shafts of the first three primaries are merely clay-coloured, and the rest are pure white, whereas in *G. candida* they are all nearly black; and barely a trace of colour is to be observed on those of the tail. The bill is slender at the base, and quite different in shape from that of *G. candida* (as shown in the accompanying drawings).

Fig. 5.



Head of *Gygis microrhyncha.*

Sparrman's figure and description are both very bad; but Gmelin's, based upon Latham, distinctly points out the characteristics of the larger and black-shafted species; so I have adopted his name for it. On the other hand I cannot identify Sparrman's bird with the smaller species, of which, moreover, I have never seen a specimen except from the Marquesas; and I have therefore been compelled to give a name to it. The larger species is also found at the Marquesas.

The nesting of *Gygis* is peculiar, the single egg of clay-white mottled with brown being placed on the cavity of the branch of a tree, or in a fork of two branches, and on the points of the coral reefs—anywhere, in fact, where it will lie. In these habits *Gygis* shows another affinity with *Anous*, of which it seems to be a highly specialized offshoot.

"*Sterna nivea*" of F. D. Bennett (Whaling Voy. i. p. 370, 1840), from the Caroline Islands, might be either of these species; and I can find no description of "*Gygis napoleonis*," Bp.

Genus ANOUS, Leach.

ANOUS STOLIDUS, Linn.

Sterna stolida, Linn. Syst. Nat. i. p. 227 (1766); id. Amœn. Acad. iv. p. 240; Gmelin, S. N. i. 2, p. 605 (1788).

Sterna fuscata, Linn. Syst. Nat. i. p. 228 (1766), ex Brisson, vi. p. 220, t. 20. fig. 1; Gmel. S. N. p. 605 (1788), juv.

Sterna pileata, Scop. Del. Faun. et Flor. Insubr. i. p. 92. no. 73, ex Sonn. Voy. p. 125, pl. 85 (1786).

Sterna senex, Leach, in Tuckey's Exped. to the Congo, App. p. 408 (1818), obtained by Cranch.

Anous niger, Steph. in Shaw's Gen. Zool. xiii. i. p. 140, pl. 17 (1825)—type of *Anous*, Leach (adult).

Anous fuscatus, Steph. in Shaw's Gen. Zool. xiii. i. p. 140 (1825), juv.

Anous spadicea, Steph. in Shaw's Gen. Zool. xiii. i. p. 143 (1825), juv.

Megalopterus stolidus, Boie, Isis, 1826, p. 980.

Sterna unicolor, Nordm. in Erm. Verz. v. Thier. & Pfl. p. 17 (1835).

Anous stolidus, Gray, List Gen. Birds, p. 100 (1841); Blyth, Cat. B. A. S. Bengal, p. 293; Gould, B. Australia, vii. pl. 33 (1848); Cassin, U.S. Expl. Exp. p. 391 (1858); Finsch & Hartl. Faun. Centralpolyn. p. 234 (1867), Vög. Ost-Afrika's, p. 835 (1870); Scl. & Salv. P. Z. S. 1871, p. 566 (Neotrop. Laridæ); Coues, B. N.W. Am. p. 710 (1874).

Anous rousseaui, Hartl. Beitr. Orn. Madagasc. p. 86 (1860).

This well-known species, a straggler to the British seas, ranges from the Gulf-coast of North America to the shores of Australia, throughout Polynesia, and occurs, in fact, in all tropical waters. There appears to be no constant difference between individuals from the most distant localities; and this similarity applies to its habits and breeding, its single egg being deposited on a nest of sea-weed placed on mangrove bushes, in the fork of a tree, or even on the bare rock.

In the British Museum there is a specimen from Dalrymple Rock, Chatham Island, one of the Galapagos group, which is of a uniform sooty brown. It is evidently an immature bird; and I am therefore unwilling to give it specific rank; but it would be somewhat remarkable if subsequent research should show that the Galapagos Islands possess a fuliginous Noddy in addition to their *Larus fuliginosus* and other peculiar forms of bird-life.

ANOUS TENUIROSTRIS (Temm.). (Plate LXI. fig. 1.)

Sterna tenuirostris, Temm. Pl. Col. 202 (1838).

Megalopterus tenuirostris (Temm.), Boie, Isis, (1826), p. 980, type of genus *Megalopterus*.

Anous melanops, Gould, P. Z. S. xiii. p. 103 (1845); id. B. Australia, vii. pl. 34 (1848); Gray, Hand-list, iii. p. 123 (1871).

Under this name two species appear to have been confounded. Temminck figures a bird with a light head and neck and *pale grey lores*. But the bird which is far more abundant in collections under this title is the species which has the *lores deep black*, figured in Gray's 'Genera of Birds' under the name of *A. melanogenys*. Temminck's type came from Senegal; and the only specimens like it which I have been able to examine as yet are two in the British Museum from the island of Rodriguez (from one of which the figure is taken), and one in Lord Walden's collection from Mauritius. In the absence of any detailed description it is impossible to say to which species the "*S. tenuirostris*" of various writers, from the Red Sea, belongs. Beyond the above localities it occurs at Houtmann's Abrolhos, on the west coast of Australia, whence Mr. Gould described and figured it under the name of *Anous melanops*. Mr. Gould's bird, however, appears to me to be identical with Temminck's, in spite of the stress laid upon the supposed absence of a black spot by the eye in Temminck's figure, which spot is conspicuously present in the plate of *A. melanops*. It seems to be a somewhat rare species, at least in collections. Besides the different coloration of the feathers between the base of the bill and the eye, it appears to be a somewhat smaller bird than *A. melanogenys*, the wing being nearly an inch shorter; the bill also, in the specimen I have seen, is relatively shorter between the angle and the tip; but a much larger series must be examined before attaching much importance to that peculiarity.

ANOUS MELANOGENYS, Gray. (Plate LXI. fig. 2.)

Anous melanogenys, G. R. Gray, Gen. Birds, iii. p. 661, pl. 182 (1849); id. Hand-list, iii. p. 123 (1871).

Anous tenuirostris, Scl. & Salv. Neotrop. Lar., P. Z. S. 1871, p. 566.

Respecting this black-faced species (see Plate LXI. fig. 2, taken from a specimen in my own collection) I can only repeat that it is generally found usurping the name of *Anous tenuirostris* in collections. It is apparently a widely distributed form, occurring on the coasts of Central America, Africa, Australia, and throughout Polynesia.

ANOUS LEUCOCAPILLUS, Gould. (Plate LXI. fig. 3.)

Anous leucocapillus, Gould, P. Z. S. pt. xiii. (1845) p. 103; id. B. Aust. vii. pl. 35 (1848); Cassin, U.S. Expl. Exp. p. 393 (1858);

Finsch & Hartl. F. Centralpolynesiens, p. 237 (1867); Gray, Hand-list, iii. p. 123 (1871).

Sterna leucocapilla, Schlegel, M. Pays-Bas, *Sternæ,* p. 37 (1863).

This form is apparently less widely diffused than some of its congeners. Mr. Gould's specimens were obtained at Raines Islet, Australia, where it is said to be very abundant. There is a specimen in the British Museum, from Bristow Island, south coast of New Guinea (from which the figure Plate LXI. fig. 3, is taken); and the United-States Exploring Expedition found it breeding at Paumotu Island, where its single egg was deposited upon the bare ground instead of in a nest. There is no grey about the head or cheeks, but, with the exception of the white crown, the whole plumage is of a sooty *brown*-black; the foot is perhaps a trifle more slender in *A. tenuirostris* or *A. melanogenys*; but it is difficult to judge from dried skins.

ANOUS CÆRULEUS (Bennett).

Sterna cærulea, F. D. Bennett, Narr. Whaling-Voy. round Globe, ii. App. p. 248 (1840)—Christmas Island and other coral formations of the Pacific.

"*Sterne cendré,*" Neboux, Rev. Zool. Oct. 1840, p. 291.

Sterna teretirostris, Lafresnaye, Rev. Zool. 1849, p. 242.

Procelsterna tereticollis, Lafresnaye, Rev. Zool. 1842, pl. 29 (type of *Procelsterna*).

Stolida cinerea, Néboux, Voy. Vénus, Atlas, pl. 9 (1846).

Anous cinereus, Gould, P. Z. S. 1845, p. 104; id. B. Australia, vii. pl. 46 (1848)—Norfolk I. and N.E. coast, Australia; Prévost & Des Murs, Voy. Vénus, v. p. 276 (1855); Finsch & Hartlaub, F. Centralpolynesiens, p. 239 (1867).

Anous parvulus, Gould, P. Z. S. xiii. (1845) p. 104; Cassin, U.S. Expl. Exp., Birds, p. 393 (1858)—Paumotu group.

Pelecanopus pelecanoides!, G. R. Gray, List of Birds in Brit. Mus. pt. iii. p. 180 (*fide* Gould, *ut suprà*).

Megalopterus plumbeus, Peale, U.S. Expl. Exp. p. 285 (1848).

Procelsterna albivitta, Bp. Compt. Rend. 1856, p. 773; Gould, Hand-b. B. Austr. ii. p. 420 (1865); Gray, Hand-list, iii. p. 123 (1871).

Sterna cinerea, Schlegel, M. P.-B. *Sternæ,* p. 38 (1863).

Procelsterna cinerea, Gray, Hand-list, iii. p. 123 (1871).

I have much pleasure in restoring to this well-defined species the name originally given to it by Mr. F. Debell Bennett, whose specimen from Christmas Island is described by Mr. Gould in P. Z. S. xiii. (1845) p. 104, under the name of *Anous parvulus,* in ignorance, no doubt, of the fact that Mr. Bennett had already given it a name accompanied by an excellent description. It may always be recognized by its pale grey head, neck, and underparts, and somewhat darker upper parts, the colour becoming deeper on the tail; the primaries are the darkest part; and the secondaries are broadly tipped with white, forming a distinct band. Neboux's figure is too dark; and, in spite of the yellow-coloured webs to the feet peculiar to this species, I was for some time in doubt, until I observed depicted in his plate a characteristic which distinguishes this species from all other members of the group, viz. that the *second tail-feather is distinctly the longest* on each side, whereas in other Noddies the *third* is the longest, the fourth being often but a trifle shorter. In this arrangement of the tail-feathers *Anous cæruleus* comes next to *Gygis*, and indeed is only placed here for convenience of treatment. In its range it is probably the most restricted of the family, being only found on the N.E. coast of Australia and throughout the coral formations of the Pacific as far as Christmas Island, a little to the north of the Equator. It was found breeding at Honden Island, in the Paumotu group, on August 21st, depositing a single egg in the concavities of the coral rock (*Peale* and *Cassin*); and we are told that it does not wander far from coral islands.

It is unnecessary in this paper to take notice of mere names, given by Bonaparte and others, to which no description is attached; but there are two supposed species which were unknown to Messrs. Sclater and Salvin when writing the "List of Neotropical Laridæ," and upon which the subsequent five years have thrown no light. In hope of clearing up the subject, I give the names and a brief description :—

Sterna atrofasciata, described by Philippi and Landbeck in 'Wiegmann's Archiv,' 1863, pt. i. p. 202, is an immature example of a small species, the wing being 9 inches long, the bill 1 inch long, black, red at the gape, the tarsus 7 lines, dull red, the mantle and wings dark ash-grey, and the underparts and rump white. This description does not apply to any known species; and it may prove to be a good one. The solitary specimen was shot at Llico, Colchagua, Chili, in December 1861, near the outlet of the great salt lake of Vichuquen.

S. acutirostris, Tsch. F. Peru. Aves, p. 305 (1846), is described as 10 inches long, bill nearly 2 inches, wing 6·6, tars. ·75; pure white below, pale grey above; bill black, with a red band in the middle, and tip horn-colour. It is found in the lakes of the Cordilleras, where *Larus serranus* breeds. A Tern with a bill nearly a third as long as the wing is certainly remarkable; but as, in describing *S. exilis*, Tschudi states that the *total* length is 7 inches, and the wing *alone* 7 inches 3 lines (!), his measurements are somewhat incomprehensible, and it is advisable to wait further information.

In concluding this revision I wish to acknowledge the assistance that I have at all times received in the Zoological Department of the British Museum, the Leyden Museum, from Prof. Peters of Berlin, M. Bouvier of Paris, and also from many friends who have placed their collections at my disposal. My thanks are especially due to Mr. Osbert Salvin, whose fine series of American Sterninæ has always been available, and whose practical experience has, at times, been of great assistance in intricate questions of synonymy and doubtful nomenclature.

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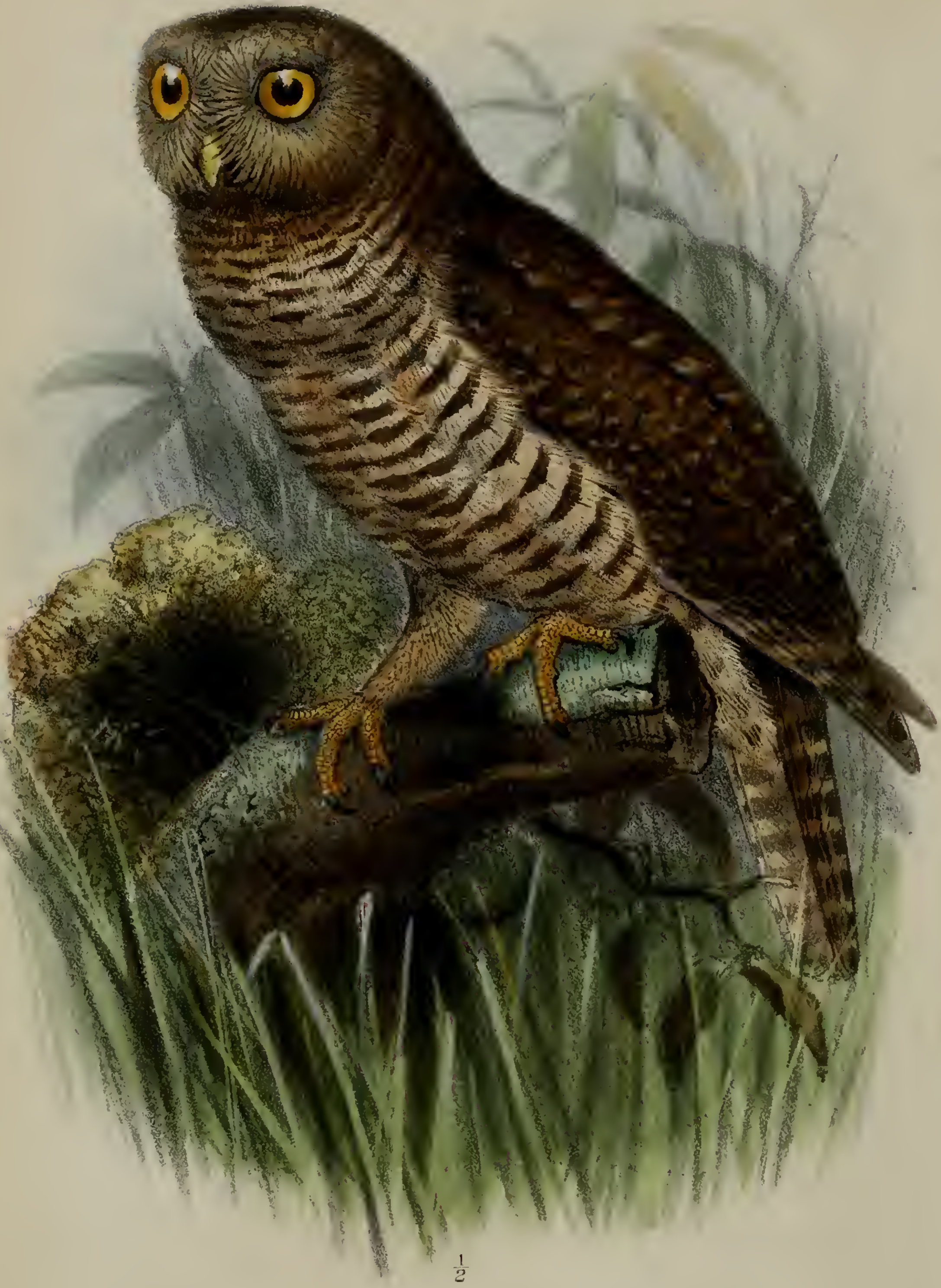

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NINOX SOLOMONIS.

7. Description of an apparently new Species of Owl from the Solomon Islands. By R. Bowdler Sharpe.

[Received June 16, 1876.]

(Plate LXII.)

Mr. Sclater has kindly submitted to my inspection a specimen of an Owl received by him from the Solomon Islands, which I cannot refer to any species of *Ninox* at present described. I therefore propose to call it

Ninox solomonis, sp. n. (Plate LXII.)

N. affinis N. hypogrammæ *sed minor: secundariis et caudâ pallide brunneo transfasciatis et corpore subtus albido brunneo transversim fasciato distinguendus.*

Adult. General colour above chocolate-brown, the head nearly uniform and more greyish brown, with a few concealed fulvous bars on the feathers, a little more distinct on the forehead; loral plumes white, with black shafts produced into hair-like bristles over the nostrils; ear-coverts greyish brown, slightly streaked with fulvous; scapulars varied with a few white bars on the outer webs, the median and greater coverts similarly barred; primary-coverts nearly uniform dark brown; quills dark brown, barred across with lighter brown, these bars buffy white on the inner web and notched with the same colour on the outer, imparting a checquered appearance to the outer aspect of the wing; tail dark brown, barred across with lighter brown, shading off into whitish on the inner webs, the outer webs notched with the same colour, the lighter bars being ten in number not including the light brown tip; under surface of body whitish, barred across with dark brown, these bars acquiring a slight reddish tinge from a conterminous narrow rufous bar adjoining the broader brown one; sides of the upper breast more uniform brown; legs tawny with light brown cross bars; under wing-coverts white barred with rufous and brown, the lower ones white transversely barred with ashy brown and resembling the lower surface of the quills. Total length 11 inches, wing 8·3, tail 4·65, tarsus 1·2.

Hab. Solomon Islands (*Mus. P. L. S.*).

This specimen is the one recorded by Mr. Sclater (P. Z. S. 1869, p. 123) as *Athene variegata*; but on comparing it with the key to the species given by me in my 'Catalogue of Birds' (ii. p. 152), it will be found not to agree with the diagnostic characters of that bird. It is also not *N. tæniata*, the only species of *Ninox* known from the Solomons, as the upper parts of the latter are barred with fulvous, whereas in the present bird they are uniform. It is closely allied to *N. hypogramma*, but is very much smaller and has the secondaries and tail-feathers barred across with paler brown; the under surface also is white with broad transverse rows of brown, whereas the general aspect of *N. hypogramma* below is rufous.

8. On a new Species of Broadbilled Sandpiper.

By H. E. Dresser, F.Z.S.

[Received June 19, 1876.]

Having lately had occasion to examine a large series of specimens of our Broadbilled Sandpiper, *Limicola platyrhyncha* (Temm.), in order to work out that species for the 'Birds of Europe,' I found on examining examples from Siberia and China that they differ constantly from our European bird in summer dress; and as I find that there are in the series I have examined no intermediate specimens between these two forms, I think that the Eastern one, which has not hitherto been described, should be separated from our western bird; and I propose to call it *Limicola sibirica.* It differs in the summer plumage in having the feathers on the crown and entire upper parts very broadly margined with bright rufous, so as to give this colour extreme prominence, the upper parts being, in fact, similar in colour to those of *Tringa minuta* in fullest summer dress. In *Limicola platyrhyncha,* on the other hand, the general coloration of the upper parts is black, the margins to the feathers being narrow and white or ochreous white, and the crown is very dark. The underparts in *Limicola sibirica* are as in *Limicola platyrhyncha,* except that the throat is less spotted, the chin and upper throat being quite unspotted. In measurements I find no constant difference, as both species vary somewhat *inter se*; but, as a rule, the eastern bird has the wing and tarsus rather longer than in *L. platyrhyncha.* In the winter plumage the two species cannot always with certainty be distinguished; but, as a rule, the eastern one appears to be a trifle paler than the European bird. As it is hardly necessary to exhibit the large series of specimens I have had for examination, I have brought three specimens of *Limicola sibirica* in full summer plumage, which are all that I have in that dress, and two in winter dress; and for comparison I have taken at random four examples of *Limicola platyrhyncha* in summer plumage and two in winter plumage. With two exceptions, all the specimens of *Limicola sibirica* I have examined were obtained in China by Mr. Swinhoe. The following is a full description of a specimen in full summer plumage from China.

LIMICOLA SIBIRICA, sp. nov.

Capite et corpore supra pulchre ferrugineis, plumis medialiter nigris vix albido marginatis; scapularibus dorso concoloribus, alis sicut in Limicola platyrhyncha *pictis, sed pallidioribus et grisescentioribus; rectricibus centralibus nigris valde rufo marginatis, reliquis griseis vix albo marginatis; fronte et stria superciliari albis; capitis et colli lateribus dorso concoloribus sed magis griseo-albo notatis; corpore subtus albo, mento immaculato, gutture nigrofusco et ferrugineo guttato.*

This species appears to breed in Northern Siberia, and to migrate southward into China in the autumn. How far westward its range extends I cannot positively say; but there is a specimen in the Cambridge Museum sent by Mr. Blyth and stated to have been obtained in "India;" but no precise locality is given. All the other specimens from India and Baluchistan are referable to *L. platyrhyncha.* I may add that there is a specimen of *L. sibirica* in full summer dress, from Siberia, in the Cambridge Museum.

9. On a new Species of *Tetraogallus.*

By H. E. Dresser, F.Z.S.

[Received June 20, 1876.]

Mr. Charles Danford, who has just returned from the Taurus mountains with a rich collection of mammals and birds, has brought a fine series of specimens of a Snow-Partridge, which he has requested me to compare and determine. As I find it is as yet undescribed, and quite distinct from any known species, I propose to give it the name suggested by him of Tetraogallus tauricus, as the Taurus range appears to be its true habitat.

Though allied to *Tetraogallus caucasicus,* this species is very easily distinguishable from that bird, not only by its coloration, as will be seen by the detailed description, but also by its much larger size. The following is the description of a pair selected from the series.

♀ adulta *pileo sordide cinereo-cano vix cervino tincto, versus nucham cervino cinereo; collo postico et dorso antico cervino-cinereis; corpore supra reliquo sicut in* Tetraogallo caucasico *picturato, sed pallide cervino cinereo nec saturate cinereo; alis sicut in* T. caspio, *sed tectricibus majoribus magis cæruleis et ad basin minus vermiculatis; cauda sicut in* T. caucasico, *sed pallidiore*; *fronte, stria superciliari, capitis lateribus et gula cervino-albis; regione suboculari pallide cano, et stria magna in colli lateribus utrinque saturate cana; gutture et pectore superiore cinereo-canis, plumis cinereo-cervino terminatis et nigro guttatis; pectore reliquo cinereo-cervino griseo-nigro vermiculato, plumis omnibus ad basin cæruleo-canis; abdomine centrali schistaceo-fuliginoso; crisso sordide cervino, subcaudalibus cervino-albis; hypochondriis cæruleo-canis, utrinque castaneo striatis et nigro marginatis, plumis nonnullis in parte suprema vermiculatis, et plumis in parte ima cinereo-cervinis nigro-cinereo vermiculatis et cervino-castaneo marginatis; rostro flavido ad basin pallidiore, naribus rufo-aurantiacis: plaga nuda circum et infra oculos læte flava: pedibus læte rufo-aurantiacis, unguibus saturate corneis: iride fusca.*

♀ *minor et sordidior; pileo vix cervino et saturate griseo notato; stria in colli lateribus et gutture antico nigro notatis, hoc griseo vermiculato; plaga nuda oculari minore; rostro et pedibus sicut in mare, sed paulo sordidioribus.*

Adult Male (Koroskeui, Taurus, 15th April, 1876). Crown dull ashy blue, with a buff tinge gradually merging into ashy buff, this latter colour pervading the hind neck and fore part of the back;

rest of the upper parts as in *Tetraogallas caucasicus*; but instead of the general tinge of colour being clear dark grey, it is lighter buffy grey; wings as in *Tetraogallus caspius*, but the larger wing-coverts are rather bluer and less vermiculated on the basal portion; tail as in *Tetraogallus caucasicus*, but rather paler; forehead, a streak over the eye, sides of head and neck creamy white, the portion below the eye pale blue-grey, connected with which is a dull darker blue-grey broad stripe down the side of the neck; entire lower throat and upper breast blue grey, the feathers tipped with ashy buff, this band on the sides of the neck becoming ashy buff and merging into the hind neck; fore part of the band irregularly but boldly spotted with black; rest of the breast to the abdomen ashy buff finely vermiculated with blackish grey, all the feathers dove blue on the concealed basal portion; centre of the abdomen sooty slate, gradually fading into dull buff on the crissum and to creamy white on the under tail-coverts; flank-feathers clear blue-grey on the centre, with a chestnut stripe on each side, and an outside margin of black, some of the feathers on the upper flanks vermiculated like the breast, and those on the lower flanks buffy ash vermiculated with blackish grey and margined with buffy chestnut; bill yellowish horn, paler at the base, nostrils orange-red; bare space round the eye and patch below the eye brilliant Indian yellow; iris dark brown; legs rich orange-red, claws dark horn. Total length about 26 inches; culmen 1·7, wing 11·8, tail 8·0, tarsus 2·6.

Adult female (Giawi-keny, 27th April). Differs from the male in being rather smaller in size and duller in colour; the crown is slightly marked with light buff and dark grey; the stripe on each side of the neck and the band on the lower throat are more buff in tinge, the latter vermiculated with grey, and both mottled with black; soft parts as in the male, but rather duller, the bare patch behind the eye smaller in extent; and the spur on the back of the tarsus is wanting. Total length 22½–23 inches, culmen 1·4, wing 10·7, tail 7·2, tarsus 2·25.

Mr. Danford gives me the following information respecting the range of the present species.

"This bird inhabits the high ranges of the Bulgardagh and Aladagh in the Eastern Taurus, and probably extends westwards to the Gök mountains near Adalia, and northward and eastward by the Antitaurus and Kermes Dagh. On Argæus, the highest mountain of the country, it certainly does not occur.

"It is strictly an Alpine bird living amongst rocks and snow, and rarely descends, even in mid winter, below the limit of the tree-growth, which may generally be taken as being at an elevation of about 6000 feet. It is very shy and wary. It pairs early in the year, and in favourable situations nests about the middle of April."

I trust ere long to issue a figure of this Snow-Partridge in the 'Birds of Europe;' and Mr. Danford promises to furnish me with more details as to its habits &c. ere then.

Mr. Danford was fortunate enough to obtain the eggs of this

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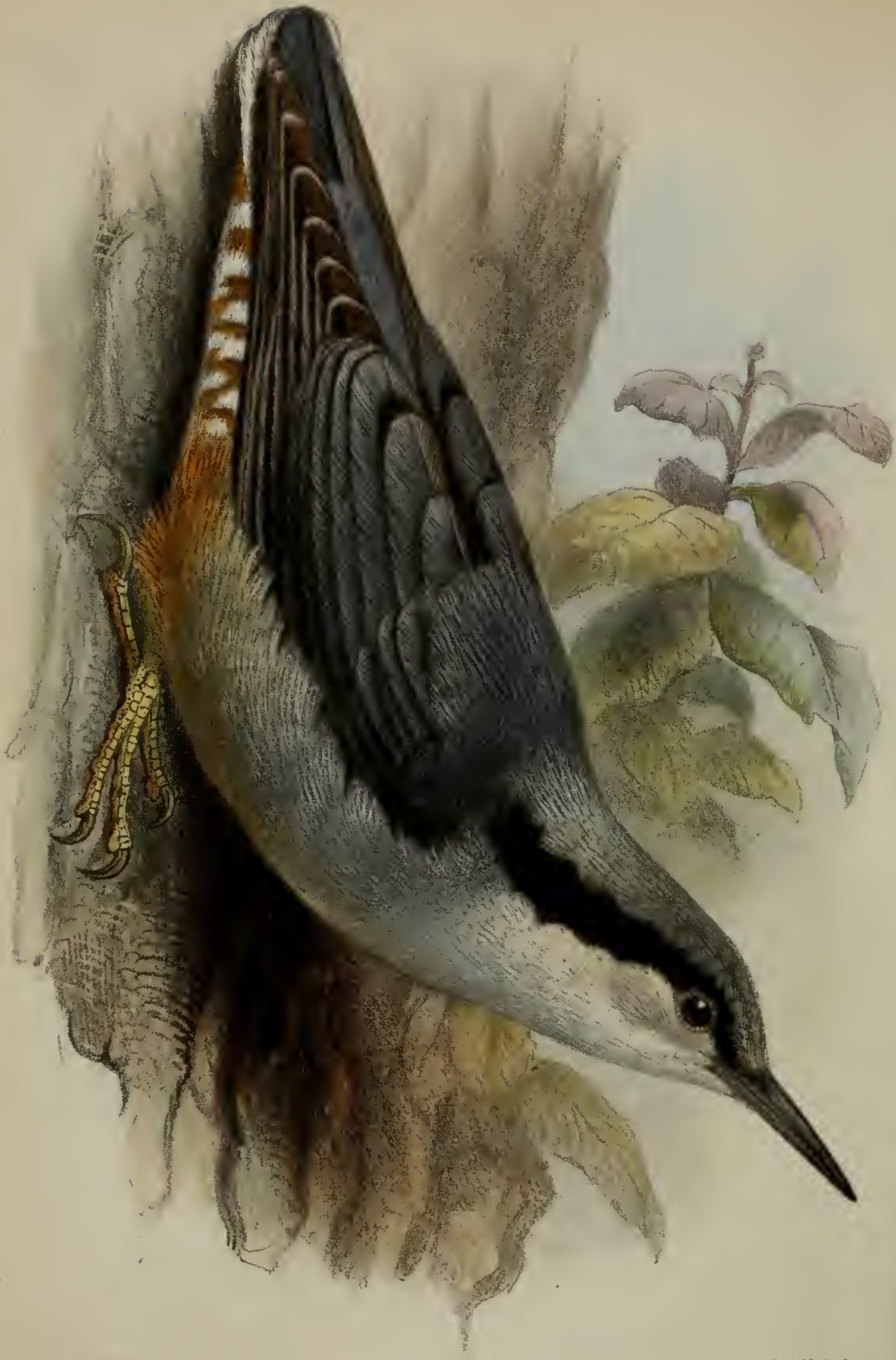


J Smit del. et lith.

M & N Hanhart imp.

SITTA MAGNA

species; and one clutch of six is now exhibited, together with an egg of *Tetraogallus caucasicus* from Kasbeck, in the Caucasus, from my own collection for comparison.

10. On an undescribed Species of Nuthatch and another Bird from Karen-nee. By Lieutenant R. Wardlaw Ramsay, F.Z.S.

[Received June 20, 1876.]

(Plate LXIII.)

I have just received from Burmah a small collection of birds made in January last in the country traversed by the recent Karen-nee-boundary expedition. Of these, two species seem worthy of note, viz.:—

1. Orocetes erythrogaster (Vig.), ♂,

which must therefore be added to the catalogue of the avifauna of that country. On the label there is nothing recorded as to where or at what elevation the bird was shot.

2. Sitta magna, n. sp. (Plate LXIII.)

General colour above dark bluish slate-colour; a black stripe, a quarter of an inch broad, on either side of the head, running from the base of the bill over the eye to the shoulder; the upper part of the head and neck between these stripes smoky grey.

Wings of much the same colour as the back. Primaries and secondaries dark brown more or less edged on the outer web with bluish slate. The second, third, and fourth primaries are slightly margined with whitish on the outer web, and, with the fifth and sixth, are white at the base. Under surface of wing greyish brown, jet-black under the shoulder.

Tail with two central tail-feathers concolorous with the back, remainder dark brown, almost black, outer pair broadly tipped with white on outer web, and margined with white on inner; next two broadly tipped with white on outer, and grey on inner web.

Under surface of body smoky grey, nearly white about throat and neck.

Lower tail-coverts, vent, and thighs brilliant chestnut, each feather of the former broadly tipped with white.

Dimensions of dry skin (male):—length 7·3 inches, wing 4·5, tail 2·7, bill from gape 1·3, bill at front 1·0, tarsus ·95.

This Nuthatch is remarkable for its great size as compared with other members of the genus.

11. Notes on a small Collection brought by Lieut. L. Cameron, C.B., from Angola. By Dr. Albert Günther, V.P.Z.S.

[Received June 20, 1876.]

The species enumerated in the following notes were obtained by Lieut. Cameron during his recent remarkable journey across Africa, and have been deposited in the British Museum.

Mammalia.

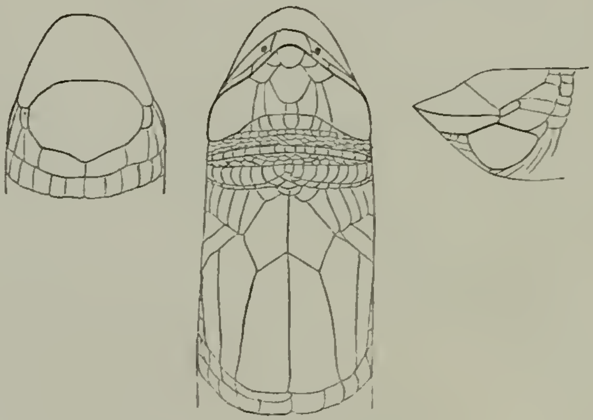
Galago maholi (Smith).

Reptilia.

An Amphisbænian, represented by a single example, proves to belong to an undescribed species of *Phractogonus*, a genus representing in Africa the South-American *Cephalopeltis*.

Phractogonus scalper, sp. n.

Anterior margin of the nasal extremity hard and sharp. Of the two large plates which cover the upperside of the head, the posterior is longer than the anterior, and not quite so long as broad, bordered behind by two pairs of rather narrow scutes. Nostrils in the anterior portion of an elongate nasal; the nasals separated by a broad median upper labial. Three upper labials on each side, of which the two anterior are very narrow, linear, the hindmost being much broader. Lower lip covered by a mental, and on each side by two short small anterior and one very large posterior labial. Ocular very small, the eye being not or scarcely visible. Three pairs of elongate thoracic shields, of which the central pair is preceded by a pair of rhombic scutes of moderate size. Præanal pores none. Sixteen longitudinal series of scutes along the dorsal half, and fourteen along the ventral half of the body; the median ventral scutes are much broader than the



Head of *Phractogonus scalper*.

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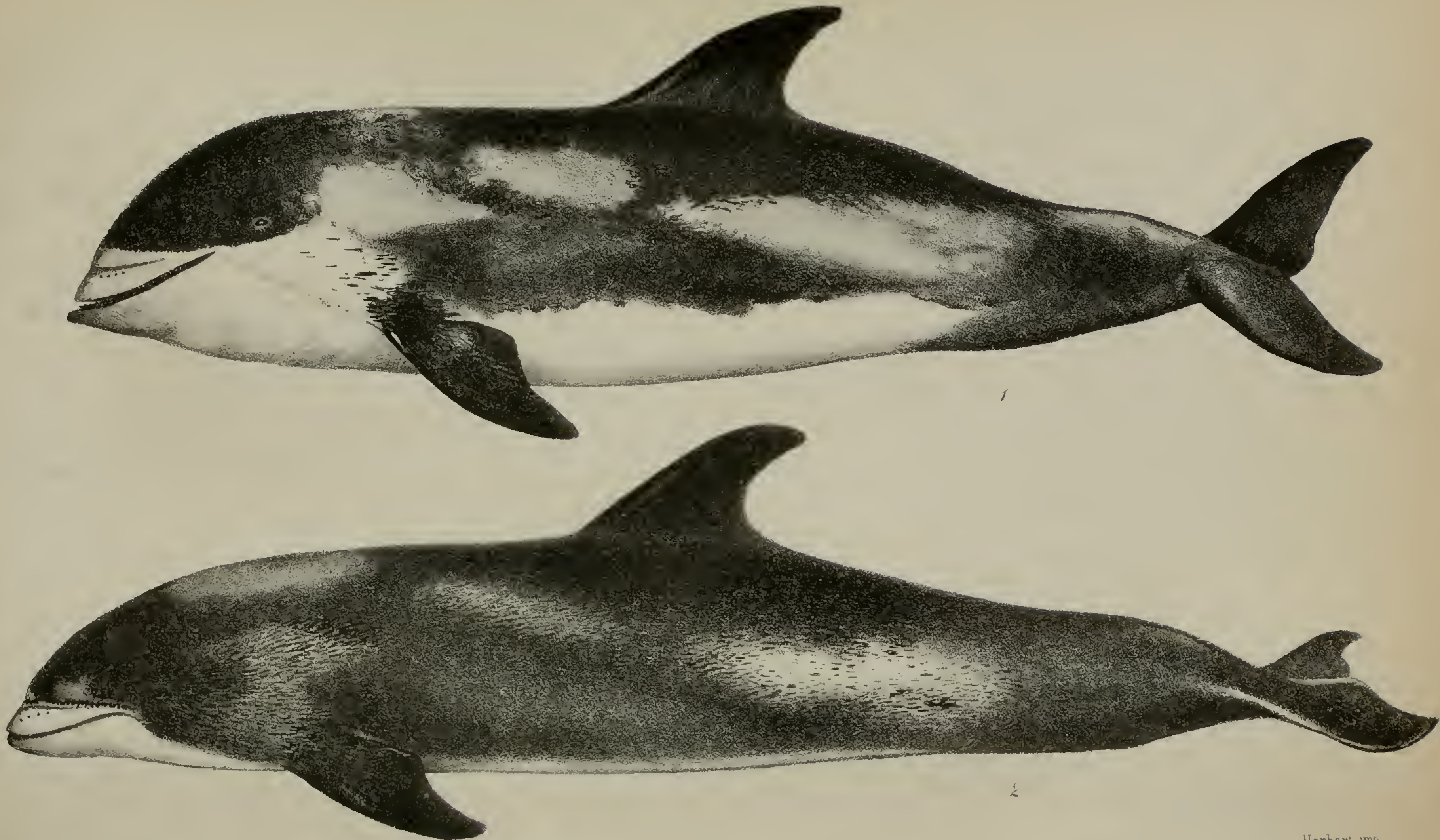

J. Smit lith.
Hanhart imp.

DELPHINUS ALBIROSTRIS

1. SPECIMEN *from* GREAT GRIMSBY. 2. SPECIMEN *from* LOWESTOFT.

lateral, and much broader than long. Upper parts and tail brownish, lower white.

Total length 13 inches, the tail measuring 1 inch.

Typhlops eschrichtii (Schleg.).
Ahætulla irregularis (Leach).
Ahætulla dorsalis (Bocage).
Leptodira rufescens (Gm.).

Insecta.

Gymnopleurus æruginosus (Harold).
Charaxes, sp. Larva.
Phymatens squarrosus.
Acridium tartaricum.
Phasma, sp.
Platypleura cameronii, sp. n. (Butler).
Occeticus, sp. Pupa-cases.

The new species of Cicada has been named by Mr. A. G. Butler, who has drawn up the following description:—

PLATYPLEURA CAMERONI, sp. n.

Purplish brown; thorax ferruginous behind, the impressions clothed with ochraceous tomentum; scutellum and abdomen blackish; costal margin of tegmina ochraceous; basal three fifths of the tegmina purplish brown, spotted with olive-brown; an oval spot in the centre of the subcostal cell; outline of brown coriaceous area sharply defined and regularly crenulated; remaining area hyaline white; three subapical large brown spots, and a submarginal series connected by a zigzag line; wings deep mahogany-brown, blackish externally, the veins paler; nerveless border hyaline white. Length 15 lines, expanse of tegmina 4 inches 6 lines.

Allied to *P. limbata* and *P. stalina*, but with the head more acuminate in front, the coloration much deeper, and the markings differently disposed and better-defined.

12. Description of a young Specimen of the *Delphinus albirostris*. By D. J. Cunningham, M.B., Demonstrator of Anatomy, University of Edinburgh. Communicated by Prof. Flower, F.R.S., V.P.Z.S., &c.

[Received June 14, 1876.]

(Plate LXIV. fig. 1.)

In September last I purchased from one of the Edinburgh fishmongers a female Dolphin, caught off Great Grimsby, which possesses characters worthy of special description.

Measurements.—

	ft.	in.
Total length in a straight line, from the point of the lower jaw to the chink of the tail	4	2
From the point of the snout to the base of the dorsal fin, following the curve of the head and back	2	1½
From the anterior part of the dorsal fin to the extremity of the tail, following the curve of the back	2	5
Girth immediately behind the flippers	2	4
,, ,, in front of dorsal fin	2	8
From the point of snout to the anterior commissure of the eyelids	0	8
From point of snout to anterior border of the root of flipper	0	11½
From the point of the snout to the blow-hole	0	8¼
From the point of snout to angle of mouth	0	6
From point of lower jaw to angle of mouth	0	6½
Anterior border of flipper	1	0
Posterior border of flipper	0	8
Girth of flipper at its root	0	9
,, ,, in middle	0	8
Extreme breadth of tail from side to side	1	1½
,, ,, from before backwards	0	5
Base of dorsal fin	0	10
Height at highest point	0	6½
From umbilicus to anterior commissure of the labia majora.	0	9

A vertical line drawn so as to divide the animal into two equal parts passed through the dorsal fin, dividing it unequally, 2 inches of its base lying in front of the line and 8 inches behind it.

Integument.—In the dorsal region the integument was of a uniform black colour, which was continued back over the dorsal fin and upper surface of the tail, and forwards over the forehead. At a short distance from the mouth this colour stopped abruptly with a sharp outline, giving place over the snout to a creamy yellow colour, this patch being deepest in front (2 inches), and gradually narrowing towards the angles of the mouth on each side, near which it ended. In front, in the middle line, a process of creamy yellow, about the breadth of the point of the little finger, and about ½ an inch long, passed upwards from the white of the snout into the forehead. The skin of the mandible, throat, and belly was creamy white. The flippers were jet-black, and the tail on its under surface was of a blackish slate-colour.

The black colour of the dorsum was not continued uniformly over the sides; but was interrupted by three white patches. Moreover the tint of black on the sides was not so deep as that over the back, being more slate-coloured. Of the white patches, one of large size (10 in. by 6 in.) was situated upon the neck, in front and above the level of the flipper. It was irregular in its outline, more or less completely divided into an upper and a lower portion by a stripe of slate-colour, and interrupted here and there by sharply defined deep-black lines and spots of small size. A slender bar of slate-colour, passing from the angle of the mouth to the root of the flipper, separated this patch from the white of the throat. The second white patch was much smaller in its area (7 in. by 2½ in.) and not so bright in colour. It was placed at a higher level than the first, and behind it. The third patch was very large (14 in. by 4 in.), and oblong or elliptical in shape. It was placed behind the middle vertical line, and was uniform over its greater part; but as the black shaded into the white, the uniformity of the latter was broken by numerous black or dark grey streaks. It was separated from the white of the belly by a narrow but decided slate-coloured band.

Head.—The curve from the neck was uniform, but at the same time decided; and this gave the head a massive appearance. The jaws were wedge-shaped; and the lower lip projected half an inch further forwards than the upper. Traversing the white snout was a well-marked furrow or groove, which commenced at the oral fissure close to the angle of the mouth, and passed round the snout to a corresponding point on the opposite side. Its depth was greater laterally than in front; and it served to give the animal a peculiar beaked appearance. From each side of the white snout, about 1 inch above the fissure of the mouth and immediately below the furrow, *four* strong black bristles projected. They were placed in a straight line and were a ¼ of an inch apart from each other.

The blow-hole was situated almost in a straight line above the eye. It had the ordinary semilunar form, and was 1 inch in breadth. The eye was protected by well marked eyelids, the fissure between which was about ½ inch long. Surrounding the eye the integument had a deeper black tint; and about an inch from it, it was surrounded by a faintly marked circle or ridge. The auditory aperture could not be detected.

Dentition.—In the upper jaw there were twenty-four teeth upon each side. Those in the centre of the range were the largest, and the anterior were smaller than the posterior. They commenced about ¼ of an inch from the middle line; and the first three on each side were not visible above the mucous membrane of the gum, but could be readily felt. Those of the lower jaw were twenty-six in number on each side. The first tooth was placed about ½ an inch behind the middle line, and, with the succeeding three, was completely covered by mucous membrane. When the mouth was closed the teeth of the two jaws interlocked; but the two anterior teeth of the lower jaw had no opposing teeth in the upper jaw. They were conical in shape, sharp and curved, the concavity being towards the tongue. They were freely movable, the greatest range of movement being outwards.

General contour of body.—This is well seen in the accompanying figure (Plate LXIV. fig. 1); and it will be noticed that, instead of tapering uniformly from behind the dorsal fin to the tail, the body suddenly expands in a vertical direction and then narrows into the part from which the tail springs. This gives a sort of humped appearance to this portion of the animal; and the hump suggests the idea of a rudimentary dorsal fin. That it is so in reality is rendered very probable by the fact that in structure it is exactly similar to the dorsal fin. It is composed of the same dense, almost glistening fibrous tissue, in the meshes of which is very little oil.

The dorsal fin had a falciform posterior border; and its base was prolonged for a short distance towards the tail by a well-marked ridge. The flipper had a very characteristic appearance. The anterior and longest margin presented a uniform convex curve from the root to the tip. The posterior border was slightly concave from the tip to about the middle; here it suddenly bulged out into a convexity which extended to the root.

Vertebral column.—The vertebræ were 90 in number—7 cervical, 15 dorsal, and 68 lumbo-caudal. The atlas and axis were fused together, so as to constitute one bone, the double nature of which, however, was indicated behind by two fissures, one on each side, which partially separated the laminæ, and in front by a partial plate of cartilage intervening between the bodies. The other five cervical vertebræ were free. The transverse processes were flat, directed somewhat forwards and imbricated.

Such being the distinctive characters of this Dolphin, we must now proceed to determine the species to which it belongs.

It presents points of similarity both to *D. albirostris* and to *D. acutus* or *leucopleurus*.

D. albirostris was first figured and described by Brightwell in 1846, under the name of *D. tursio* (Fabr.), in the 'Annals and Magazine of Natural History' (vol. xvii.); but Dr. J. E. Gray, recognizing this error of nomenclature, pointed out that it was a new species, and gave it the specific name of *albirostris*. The specimen described by Brightwell was a female caught off Yarmouth, and it measured 8 feet 2 inches in length. The following is Brightwell's description:—"The colour of the upper part and sides a very rich deep purple-black. The external cuticle was of a soft and silky texture, and so thin and delicate that it was easily rubbed off. The nose and a well-defined line along the upper jaw, and the whole of the lower jaw and belly, were of a cream-colour, varied in some parts by a chalky-coloured white, contrasting beautifully with the rich black of the body. The fins and tail were of the same colour as the back." Gray[*], Lilljeborg[†], and Bell[‡], all follow this description; and it may therefore be considered the source from which they have drawn their information; moreover Gray and Bell have reproduced the figure, the former on a larger and the latter on a smaller scale. The drawing represents an animal of an entirely different mould from the Dolphin I have described. The head has not the same massive appearance, but is characterized by the great prolongation forwards of the jaws; whilst, behind the dorsal fin, the body tapers sharply and uniformly towards the caudal expansion, showing nothing of the bump or rudimentary dorsal fin which constituted such a prominent feature in the Great-Grimsby specimen. Again, the sides are deep black over their whole extent; and if we divide the animal represented in Brightwell's figure into two equal parts by a middle vertical line, we find that the anterior border of the dorsal fin lies $\frac{1}{2}$ an inch behind this line, which in the specimen itself would represent a distance of 7 inches*. In the Great-Grimsby Dolphin the middle vertical line passed through the dorsal fin, dividing it unequally, 2 inches lying in front and 8 inches behind it.

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[*] Gray, Cat. of Seals & Whales, 1866; Synopsis of Whales & Dolphins in Brit. Mus. 1868.

[†] Lilljeborg, Mem. on Cetacea, Ray Soc. 1866.

[‡] Bell, British Quadrupeds (2nd edition), 1874.

Indeed, with the exception of the white snout, the figure of this animal given by Brightwell, and reproduced by Gray and Bell, presents not a single feature in common with the Great-Grimsby Dolphin.

At first, not fully recognizing the fact that the authors I have mentioned in connexion with this species had borrowed their details from Brightwell, the original describer, and that any inaccuracy on the part of the latter would consequently be reproduced by the others, I was induced to consider the Great-Grimsby specimen a new species, and this in the face of many essential points of similarity between the skeletal peculiarities of it and *D. albirostris*. I have been deterred from doing this by my attention being redirected by Prof. Flower to another and independent account of this species by Prof. Van Beneden†. This memoir I had at first been inclined to regard as of small value, so far as my wants were concerned, seeing that it differed so greatly in its facts from the writings of the authors I have mentioned, and in whom, at the time, I was placing implicit trust, and also owing to a certain discrepancy which existed between Van Beneden's description and his accompanying figure, which made me doubtful as to the accuracy of the whole. But a more careful study of it, and looking at the plate more as a guide to the general outline of the body than as a representation of the markings, I was able to establish certain features in common between it and the specimen I have described; moreover my faith in Brightwell's description and figure has been much shaken.

The drawing given by Van Beneden shows an animal somewhat blunter about the head than that represented by Brightwell, and with a slight approach to the hump close to the tail; but then the lower lip does not project beyond the upper, and the dorsal fin lies altogether in front of the middle vertical line, which corresponds to its posterior margin. The markings are also peculiar and do not in every respect agree with the accompanying letterpress description.

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* The animal measured 8 feet, whilst in the drawing it occupies a space of 7 inches; $\frac{1}{2}$ an inch in the latter therefore would be equal to 7 inches in the specimen itself. But this does not agree with the accompanying letterpress, in which it is stated that from the tip of the nose to the dorsal fin the animal measured 3 feet 5 inches, and that the base of this fin was $11\frac{1}{2}$ inches long. According to these measurements, therefore, 8 inches of the fin must have been in front of, and 3 inches behind the middle vertical line. In reproducing the drawing Gray must have noticed this inaccuracy and adopted a middle course; for in his figure the dorsal fin lies immediately behind the middle vertical line; and this is the only respect in which his plate differs from Brightwell's.

† Van Beneden, "Recherches sur les Cétacés," Nouv. Mém. de l'Acad. R. de Bruxelles, t. xxxii. 1862.

The white of the snout passes up so as to encircle the eye; a faintly marked streak passes in a horizontal direction from above the eye along the flank, and ends in front of the dorsal fin, whilst the body behind the dorsal fin appears to be white.

Van Beneden's own description of the Dolphin, which is framed from an examination of two female specimens caught by the fishermen of Ostend, one of which measured 7 feet in length, is as follows:—"The head is prolonged into a sort of beak. From the base of the beak, the head, the back, all the dorsal fin, the base of the tail and upon the side, to the middle of the flanks, the skin is of a beautiful black; also the caudal fin and a great part of the pectoral fin. The beak, or that part of the snout which rises abruptly, is of a yellowish white. The entire lower surface of the body is of a shining white. But what, in the markings, seems to characterize this species best, independently of the pale colour of the beak, is a white band which stretches upon the sides parallel to the vertebral column, commencing above the eyes and becoming lost, below the anterior border of the dorsal fin, in the white colour of the abdomen. It follows from this that the body is white below, upon the side of the abdomen and tail, and that an equally white band is present upon the side of the back." Then in the following page he states that "the lower jaw projects almost an inch beyond the upper."

But this description does not agree with the plate which accompanies it. As I have mentioned, the latter represents an animal in which the whole posterior part of the body is of a light colour, and in which the jaws are of equal length *, whilst in the letterpress (p. 28) we find it clearly stated that "the back, dorsal fin, and caudal fin are of a beautiful black," and that the lower jaw projects an inch beyond the upper. The author makes no reference to the position of the dorsal fin; and we are therefore left to infer its situation from the drawing.

The memoir also contains an elaborate account of the skeletal peculiarities of this species. The vertebræ are from 90 to 94 in number; and the atlas and axis are anchylosed, whilst the other five cervical vertebræ are free and possess thin overlapping transverse processes.

He states that in both specimens the dentition was $\frac{25}{25}$; Lilljeborg quotes it as $\frac{26}{27}$, Gray as $\frac{25}{24}$, and Brightwell as $\frac{24}{23}$.

Now as it appears to me that Van Beneden's account of *D. albirostris* is the most reliable, I purpose making it the standard with which to compare the Great-Grimsby Dolphin, in order to determine whether or not it belongs to this species. But in making this comparison, it must be borne in mind that the semicartilaginous state of some of its bones, the characters of the skull, and the bristles on the snout, all contributed to show that the Great-Grimsby specimen had not nearly reached adult life.

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* I do not refer to the drawing of the skull, which he also gives. This shows a greater length of the inferior than the superior jaw.

The characters of the skeleton are almost identical in both. Thus the present specimen agrees with *D. albirostris* in the number of the vertebræ and in the peculiarities of the cervical vertebræ. There are, indeed, a few points of difference to be detected in the skull; but these are of minor importance and probably merely the differences of youth and age.

The differences of import are to be found (1) in the character of the markings, (2) in the general shape of the body, (3) in the position of the dorsal fin. I consider, however, that the extreme youth of the specimen may account for the first two of these dissimilarities. The discrepancy in the markings is not great, and consists chiefly in the white patches on the side being more strongly pronounced and more distinctly separated by the black. Then as regards the difference of shape, we know that a massive head, or a head large in proportion to the rest of the body, is a peculiarity of youth in many animals. The position of the dorsal fin in relation to the middle vertical line, however, is a difficulty not so easily got over; we can scarcely suppose that as the Dolphin advances in age, the dorsal fin advances upon the back, at least to such an extent as to lie entirely in front of the middle vertical line. But the drawing of Van Beneden is the only guarantee that we have of its position in front of this vertical line; and as we have already seen this to be in fault in one or two particulars, it is not improbable that it is in error in this respect also.

I believe, therefore, that I am justified in regarding the Great-Grimsby Dolphin as a young specimen of the *D. albirostris* as described by Van Beneden.

An interesting feature in the case, however, is the striking resemblance in external characters which this Dolphin presents to the *D. acutus* of Gray*. In both there is the same general outline of body, massive head, and humped appearance close to the tail; and in both the sides are piebald, the markings, however, differing in character. Here the similarity ceases; and in skeletal peculiarities they diverge widely from each other. The *D. acutus* has 80 or 82 vertebræ; and in the cervical region the first four are ankylosed together, the first three completely, the fourth simply by its spinous process. In the Great-Grimsby specimen, as we have seen, the vertebræ numbered 90, and in the cervical region the atlas and axis alone were fused together. These characteristics, in conjunction with the white snout, are sufficient to show that the Dolphin I have described could not be considered referable to *D. acutus*.

It will not be inappropriate to conclude this communication with a brief summary of the various localities in which the recorded specimens of *D. albirostris* have been captured; and in this way an idea of the geographical distribution of the species may be obtained.

D. albirostris is a native of the North Sea, but is also found in the Baltic.* Eschricht states that it appears regularly in Davis's Straits in the wake of migratory fish, at the time when the Beluga and Narwhal leave their winter quarters for the Polar regions.

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* Gray, Spicil. Zool. 1828; Rasch, Nova Species Descripta cum tabulis ii. 1843; Duguid, Ann. and Mag. Nat. Hist. vol. xix. 1864; Schlegel, Abhandl. Zool. &c. 1841, tab. i. & ii. fig. 4, tab. iv. fig. 5.

The following table shows the localities in which it has been caught.

Coast of England.

	South Coast	A male in 1871. Its anatomy was described by Dr. Murie (Proc. Lin. Soc. 1871). Skeleton in Brit Mus.
Coast of Norfolk.	Yarmouth	A female (described and figured by Brightwell Ann. and Mag. Nat Hist. vol. xvii. 1846). Skull in Brit. Mus.
	Cromer	Specimen shot by Mr. Upcher (Ann. & Mag. Nat. Hist. vol. xviii. 1866). Skull in British Museum.
	Lowestoft	Specimen captured a few weeks ago. In the possession of Mr. J. W. Clark of Cambridge.
	Great Grimsby	Young female, now described. Skeleton in Edin. Univ. Museum.
	Hartlepool	First recorded specimen, 1834. Skull in Cambridge Museum.

Coast of Belgium, Denmark, Norway, and Sweden.

Ostend	Two females, described by Van Beneden (Nouv. Mém. de l'Acad. Brux. t. xxxii. 1861).
Kiel	Two specimens, one of which furnished to M. Claudius the subject of his memoir entitled "Dissert. de Lagenorhynchis" (Kiliæ 1853).
Bergen	One specimen. Skull in Museum there.
Gullholmen	Two pregnant females. Skeleton of one preserved by F. A. Smith, Acad. Docent., and now in the Museum of the Univ. of Upsala.
Skanör	One stranded. Lower jaw in the Zoological Museum of the University of Lund.

Specimens have also been seen off the Färoe Islands.

In conclusion my best thanks are due to Mr. J. H. Scott, Demonstrator of Anatomy, for the accurate water-colour drawing which he executed of the Great-Grimsby Dolphin. It is from it that the accompanying figure (Plate LXIV. fig. 1) is taken.

13. Notes on a Dolphin taken off the Coast of Norfolk.

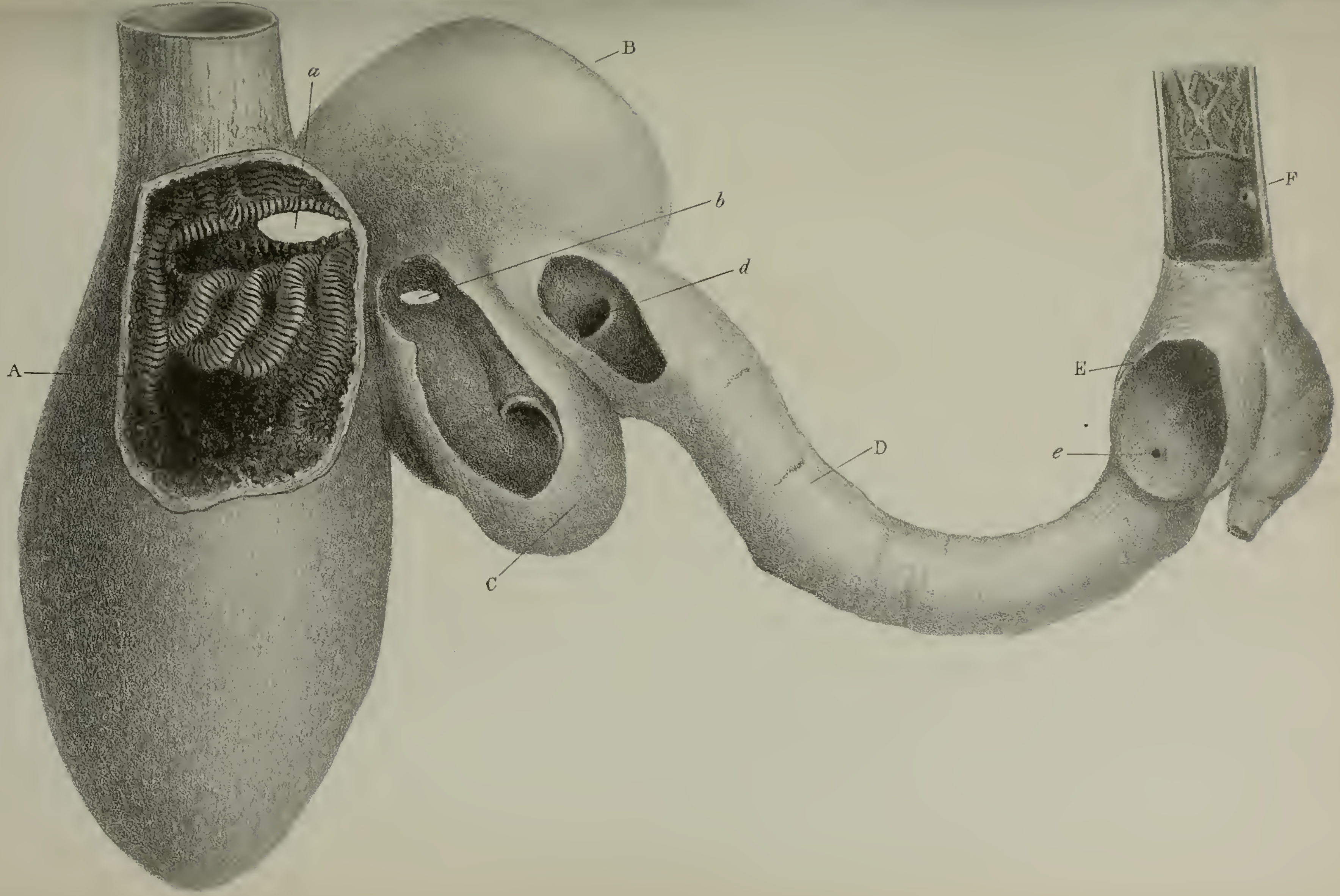
By J. W. Clark, M.A., F.Z.S.

[Received June 20, 1876.]

(Plate LXIV. fig. 2 & Plate LXV.)

On the 26th of March in the present year a large Porpoise was caught by some fishermen off Lowestoft. It was fortunately secured for me on the same day, and despatched to Cambridge. The men who captured it called it a White-beaked Bottlenose.

The animal was a male, and, as was discovered afterwards by the condition of the bones, quite young. The weight was 139 pounds.



J Smit lith.

Hanhart imp

STOMACH OF DELPHINUS ALBIROSTRIS

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The principal dimensions were as follows:—	ft.	in.
Length, from anterior edge of upper lip to notch in middle of caudal fin	5	$5\frac{1}{2}$
From upper lip to posterior edge of blow-hole (following curve)	0	11
From upper lip to anterior edge of dorsal fin (following curve)	2	6
From anterior edge of dorsal fin to notch in middle of caudal fin (following curve)	3	4
Length from upper lip to notch in middle of caudal fin (following curve)	5	10
Height of anterior edge of dorsal fin (following curve)	0	$10\frac{3}{4}$
Total vertical height of the same	0	6
From upper lip to junction of anterior edge of pectoral fin with the body	1	$2\frac{1}{2}$
From tip of snout to navel (marked by a black V-shaped spot $\frac{7}{8}$ inch long)	2	6
From tip of snout to pudendal orifice	3	$0\frac{3}{4}$
From tip of snout to anus	3	10
From upper lip to angle of mouth	0	$7\frac{5}{8}$
From upper lip to anterior angle of eye	0	$9\frac{1}{4}$
Length of eye-aperture	0	$0\frac{3}{4}$
From posterior angle of eye to ear-aperture	0	$1\frac{3}{4}$
From angle of mouth to anterior angle of eye	0	$1\frac{3}{4}$
Pectoral fin, length from junction of anterior edge with body to tip	1	0
Pectoral fin, from junction of posterior edge with body to tip	0	$7\frac{3}{4}$
Pectoral fin, breadth at base	0	5
Pectoral fin, greatest breadth	0	$4\frac{1}{2}$
Breadth of caudal fin across the flukes	1	3
Vertical height of body, at the eye	0	$8\frac{3}{4}$
,, ,, ,, immediately behind the pectoral	0	11
,, ,, ,, immediately in front of the dorsal fin	0	$11\frac{3}{4}$
Width between the pectorals	0	$5\frac{3}{4}$

Behind the dorsal fin the body becomes rapidly compressed, as will be seen from the accompanying figure.

	inches.
At $8\frac{1}{2}$ inches behind the dorsal fin, the width was	5
At $16\frac{1}{4}$,, ,, ,,	$2\frac{1}{4}$
At $21\frac{3}{4}$,, ,, ,,	$1\frac{1}{2}$

The vertical height at the first position was 8 inches, at the second $6\frac{3}{4}$ inches, and at the third $3\frac{1}{2}$ inches. The line of the back sloped gradually to the caudal fin; the ventral line, at a point 10 inches distant from the central point of the fin, turned upwards rather abruptly and suddenly.

The front part of the head was rounded between the eyes; but the upper lip was separated from this by a deep furrow on either side, and projected forwards exactly like the peak of a cap. The lip was 2 inches broad at its extreme anterior point, where the furrows are $\frac{3}{4}$ inch apart, separated from each other by a ridge, and it narrowed gradually to a breadth of half an inch at the angle of the mouth. At a distance of $1\frac{1}{4}$ inch from the tip of the upper lip were four minute black bristles on either side, set in a line parallel to the lower edge of the lip, and a quarter of an inch apart. The longest of these measured one sixteenth of an inch.

The crescentic aperture of the blow-hole, $1\frac{1}{8}$ inch in width, was placed directly over the eyes.

The general form of the animal will be best understood from the figure (Plate LXVI. fig. 2), taken partly from a photograph and partly from notes and measurements made by myself. The coloration was singularly beautiful, and I fear that no drawing can give any adequate idea of it.

The upper part of the body generally was a glossy black, and the under a creamy white. The upper lip (before described) was white, with a black spot at the tip, and a few irregular pale grey cloudings on its surface. The convex forehead was at first white for half an inch on the right side, and a quarter of an inch on the left; this white space was bounded by a wavy line of black spots of different dimensions, including a subtriangular space of a brownish colour, 2 inches broad, dotted with darker spots.

Immediately behind the blow-hole was an ogee of black, $1\frac{1}{8}$ inch deep, succeeded by a space of light brown colour $8\frac{1}{2}$ inches wide by 9 inches deep. Beyond this the whole upper surface of the body was black till about 18 inches from the tail, when it became grey. At a point 10 inches from the centre of the tail this grey ceased, and the tail became black above and below. The underside of the caudal fin was irregularly streaked with grey; and there was a white spot on the raphé.

Behind the eye and just above the pectoral fin was an irregular patch of light yellowish-brown flecked with numberless spots and dashes of brown of more than one shade, with an occasional black mark. There was a long narrow band above this and between it and the dorsal fin, sparingly spotted; and a second space, marked like the first, commenced at about the middle of the band and extended backwards to a point halfway between that and the tail. The markings upon both of these cannot be better described than by comparing them with those upon a sheet of blotting-paper that has been much used. They were thickest at the sides of the space, of which a small portion, just in the centre, was free from markings altogether. Between these spaces the black was less intense; a band of it, however, extended between the second space and the white of the belly.

The pectorals were black above and below; and a few grey markings, which maintained a uniform width of about 6 inches, extended beneath them over the white undersurface of the body, till at the anus the dark grey colour of the sides curved downwards and narrowed the white to less than half its width. Behind the anus there was a patch of light brown about 6 inches long, succeeded by black as described above.

Skeleton.—The condition of the bones when macerated showed at once that the animal was a very young one. All the epiphyses were distinct; the transverse processes of the ribs and the terminal cartilages of the scapulæ were unossified; and the bones themselves were quite soft and spongy.

The total number of vertebræ is 90 or 91, which may be divided into 7 cervical, 14 dorsal, 24 lumbar, and 45 or 46 caudal. These latter are difficult to count accurately, as the last of the series are mere specks of cartilage.

The first two cervical vertebræ are ankylosed; the remaining five are free. These have each a superior and an inferior transverse process, with the exception of the seventh, in which the inferior process is absent. These processes are directed forwards and overlap each other. Those of the fifth vertebra are the least developed. The superior process of the seventh is extremely large, and overlaps those of the fourth, fifth, and sixth completely.

There are fourteen pairs of ribs. The first six have long necks, reaching in each case to the articular surface on the side of the vertebra in front of that to which the tubercle is attached. At the seventh the necks cease suddenly, and it and the remaining ribs are attached by their tubercles only to the transverse processes of the vertebræ. This attachment becomes less and less close till the fourteenth rib is reached, which is attached by ligament nearly an inch in length to the transverse processes of the fourteenth and fifteenth thoracic vertebræ.

There are nine pairs of sternal ribs. The first pair articulate to a facet upon the centre of the wings into which the sides of the first segment of the sternum is expanded; the second at the junction of the first and second segments of that bone; the third at the junction of the second and third segments; and the fourth, fifth, and sixth to the hinder end of the third segment.

The spines of all the thoracic vertebræ are well developed and inclined backwards. This inclination gradually diminishes. The tenth vertebra has an absolutely vertical spine, as have all the lumbar vertebræ. In this portion of the column they are of great height, with well-developed metapophyses. The spines reach their greatest height at about the thirty second vertebra (counting from the first cervical), and cease at the seventy-fourth.

The characters of the skull could not be ascertained, as it has not yet been sufficiently macerated. It measured 14½ inches from the occipital condyles to the tip of the beak, which was 3 inches wide at the termination of the dental series. Length of dental series in a straight line 5½ inches. Dental formula $\frac{23-23}{26-23}$. Unfortunately the lower jaw was carelessly macerated, and some of the teeth had fallen out, so that it was impossible to count them accurately; but probably twenty-six might be set down as the number on both sides of the lower jaw. The teeth are all conical, recurved, sharp; those at the tip had not yet passed the gum.

Viscera.—The tongue measured 6 inches in length by 2 in width. The tip was a sharply pointed triangle, on each side of which for a distance of nearly 2 inches it was deeply fimbriated. Some of these fimbriations were a quarter of an inch in length. Near the base were the orifices of numerous glands and several black spots.

The stomach (Plate LXV.) differs somewhat both from that of the Porpoise (*Phocæna vulgaris*) and that of the Pilot Whale (*Globicephalus melas*) described and figured by Prof. Turner*.

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* Journal of Anatomy, vol. ii. p. 72.

The œsophagus leads directly into a pyriform sac (A) about 7 inches deep. There was no sudden line of demarcation between the œsophageal and gastric mucous membranes; but that of the œsophagus seemed to be carried on into the gastric cavity, where it was disposed in irregular folds, which were thickened and twisted across the floor of the opening (*a*) into the second stomach (B). This is nearly spherical, 4 inches in diameter, and lined with very soft and delicate mucous membrane, puckered into wavy folds almost like the cells of a honeycomb in shape.

At a distance of little more than half an inch from (*a*) a second opening (*b*) led into the third stomach (C), which is long and narrow, with very thin walls, and returned upon itself so that the second portion, which is separated from the first by an incomplete septum, is nearly parallel to the first. It leads by an oval opening (*d*) into the long and narrow cavity (D), 7 inches in length, which communicates by an orifice scarcely wide enough to admit a large pin with the expanded duodenum (E). Into this the hepatic and pancreatic ducts open at the summit of a papilla, three inches from the above-mentioned orifice. Immediately beyond this the intestine proper commences.

The rest of the viscera do not present any peculiarity. The brain was too soft to admit of examination.

I may mention that I could find no trace of any parasites. The same peculiarity is mentioned by Prof. Van Beneden in his description of what I think must be an individual of the same species.

The external characters of this animal show plainly that it must be referred to the genus *Lagenorhynchus*; and the number of its vertebræ and ribs, together with the condition of its cervical vertebræ, would determine it to be *L. albirostris*, were it not for the peculiarity of its colouring. This differs somewhat remarkably from the examples recorded by Dr. Brightwell, Prof. Van Beneden, and Mr. Moore.

The first two of these descriptions have been so fully discussed by Dr. Cunningham that I need not allude further to them, except to mention that Dr. Brightwell's was a male, and Prof. Van Beneden's both females. All three were apparently adult.

Mr. Moore's specimen was taken at the mouth of the Dee, Dec. 29, 1862. It was a male, 9 feet long, and therefore adult like the others. His description, which agrees fairly well with our specimen, is as follows:—

"The general colour is a rich black. A long and narrow greyish streak extends on either side diagonally across the ribs; and a similar greyish hue occurs on each side of the dorsal ridge, extending nearly from the fluke to the tail. The beak white, irregularly blotched with blackish, the white extending slightly above the constriction of the beak. The under jaw and throat milk-white, which colour extends along the belly, but becomes less clear as it approaches the vent"*.

The descriptions agree in representing the whole of the underside of the body, the lower jaw, and the upper lip as white; and Van Beneden's figure shows a patch of light grey behind the eye. His figure, making allowance for age, might well serve for that of our animal, as the lighter grey which prevails between the caudal and dorsal fins might easily become pure white when adult.

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* Ann. & Mag. Nat. Hist. ser. 3, vol. xi. p. 269 (1863).

The figure and description that diverge most are those of Dr. Brightwell. The black colour is described as extending over the whole upper surface of the body in his specimen. This might, however, be an individual variation.

On the whole, in the absence of a larger series of specimens for comparison, I am disposed to agree with Dr. Cunningham, and conclude that my specimen is, like his, a grey *Lagenorhynchus albirostris*.

EXPLANATION OF PLATES LXIV. & LXV.

Plate LXIV.

Fig. 1. *Delphinus albirostris*, from Great Grimsby, see p. 679. From a sketch by Mr. J. H. Scott.

2. *Delphinus albirostris*, from Lowestoft, see p. 686. Reduced from a photograph and a figure drawn by Mr. J. W. Clark.

Plate LXV.

Stomach of *Delphinus albirostris* (Lowestoft specimen), two-thirds of the natural size. A, first stomach; *a*, opening into second; B, second stomach; *b*, opening into third; C, third stomach; *d*, opening from C into the long cavity D; E, duodenum; *e*, orifice opening into it; F, opening of pancreatic and hepatic ducts.

14. Notes on the Anatomy of certain Parrots. By A. H. Garrod, M.A., F.R.S., Prosector to the Society.

[Received June 19, 1876.]

Since the publication of my paper "On some points in the Anatomy of the Parrots," in the 'Proceedings' of the Society (1874, p. 586), I have had the opportunity of dissecting several species, some of which, from their peculiarities, deserve special note. They are the following:—

1. *Dasyptilus pecqueti*. It is through the great kindness of Dr. A. B. Meyer that I have had the advantage of being able to dissect this extremely rare bird. Dr. Meyer obtained the specimen in New Guinea, and has preserved it in spirit, entire. He has most liberally allowed me to determine those anatomical points to which I have drawn attention in the paper above referred to.

There are two carotid arteries; the left, however, runs superficially as in the Psittacidæ (as defined by me). The oil-gland is large, subglobose and possesses a well-developed tuft of shortish feathers around its orifices. The rectrices are twelve in number.

In its myology and osteology it agrees with the Pyrrhurinæ in entirely wanting the ambiens muscle, and in having a furcula, which bone is not large or powerful, nor so slender as in the Lories.

The orbital ring is incomplete, the eye not being encircled by bone. The femoro-caudal muscle is large; and the semitendinosus with its accessory head are well developed,—in which arrangements it agrees with all the Psittaci.

The intestines are 17¼ inches long, there being no trace of cæca. The liver-lobes are somewhat unequal in size, the left being the smaller. The stomach is small and much like that in the Fruit-eating Parrots generally. The proventriculus forms a dilated sac, of which the walls, instead of being, as is usually the case, thick and glandular, are strikingly thin, at the same time that no glands are visible.

Dr. Meyer has already* given a short description of the peculiarities of the tongue, and, in writing to me, tells me that he has further observations to make on the same.

As in nearly all birds, the main artery of the thigh is the sciatic, whilst the vein is the femoral.

There is a fenestra near the posterior margin of the sternum, on each side.

2. *Deroptyus accipitrinus.* A Brazilian specimen of this rather peculiar genus from the Society's collection has the two carotids arranged as in *Dasyptilus*, the left being superficial. The furcula is of fair size, the orbital ring incomplete, the oil-gland well tufted, the ambiens muscle absent.

3. *Polyteles barrabandi* possesses two carotids, normally situated—in other words, side by side in the hypapophysial canal. The furcula is small and slender. The oil-gland is decidedly large, and well tufted. There is no ambiens muscle. The intestines measured 40 inches.

4. *Chalcopsitta scintillata* has the two carotids normally situated, a small furcula, a small tuft to the large oil-gland, and no ambiens muscle. The intestines measured 37 inches.

5. *Coryphilus fringillaceus* has the two carotids normal, the furcula small and slender, no ambiens muscle, and a well-tufted oil-gland. This specimen was kindly given me by Canon Tristram, carbolized and dry.

Of genera which have already passed through my hands I have had the following additional species:—

Ara militaris.
Cacatua moluccensis.
—— *philippinarum.*
Eclectus grandis.
Eos reticulata.
Licmetis tenuirostris.
Lorius domicilla.
Pœocephalus meyeri.
Tanygnathus albirostris.

They all agree with those species previously dissected, except *Licmetis tenuirostris*, which has only one carotid, the left, whereas *L. pastinator* has two. It will be interesting to verify this difference between the South-Australian species and its more western ally; for the uncertainty of the disposition of these vessels in the Cacatuinæ is rendered more striking if it is correct.

In the specimen dissected, of *Cacatua philippinarum*, a gall-bladder was present. This is the only case in which I have seen this viscus in any Parrot.

Formulating the varying characters of the above newly dissected genera upon the principle adopted in my earlier paper and there explained, the formulæ run thus:—

(1) *Dasyptilus* 2.—.+.+.
(2) *Deroptyus* 2.—.+.+.
(3) *Polyletes* 2.—.+.+.
(4) *Chalcopsitta* 2.—.+.+.
(5) *Coryphilus* 2.—.+.+.

Such being the case, *Dasyptilus* and *Deroptyus* fall into my subfamily Pyrrhurinæ, whilst the other three must be placed with the Palæornithinæ. It is interesting to notice that *Deroptyus* agrees with *Pyrrhura*, and not with *Conurus*.

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* Mittheil. aus dem k. zoologischen Museum zu Dresden, 1875, p. 14.

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,, ,, 7,	7	,,	(1876).	,,	0	15	9	1	1	0
,, ,, 8,	10	,,	(1876).	,,	0	18	0	1	4	0
,, ,, 9,	6	,,	(1876).	,,	1	4	0	1	12	0

The following are the contents of the most recently published Part of the "Transactions":—

Vol. IX. Part 9. "On the Avifauna of the Galapagos Archipelago." By Osbert Salvin, F.R.S. (Six Plates.)

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According to present arrangements the 'Proceedings' are issued in *four* parts, as follows:—

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OF THE

SCIENTIFIC MEETINGS

OF THE

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OF LONDON.

FOR THE YEAR

1876.

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November 7, 1876.

Prof. Newton, F.R.S., V.P., in the Chair.

The Secretary read the following reports on the additions to the Society's Menagerie during the months of June, July, August, and September 1876:—

The total number of registered additions to the Society's Menagerie during the month of June was 156, of which 56 were by birth, 44 by presentation, 35 by purchase, 19 were received on deposit, and 2 by exchange. The total number of departures during the same period, by death and removals, was 149.

The most noticeable additions during the month of June were as follows:—

1. Four Galapagan Tortoises (*Testudo elephantopus*), two of which were deposited by Sir C. Wyville Thomson, on the 7th of June, and two by Commander Cookson, R.N., on the 10th of June. These Tortoises were obtained by Commander Cookson, of H.M.S. 'Peterel,' under the circumstances stated in the letter read at the last Scientific Meeting of the Society, at Albemarle Island, Galapagos group. There is great interest attached to these large Tortoises, now almost extinct; and we have to thank Dr. Günther for arranging for the deposit of the living specimens in the Gardens.

The following are the present measurements of these animals:—

Sex.	Weight.	Length.	Breadth.	Received from
	lb.	ft. in.	ft. in.	
♂	273	3 3	2 4	H.M.S. 'Peterel.
♀	101	2 4½	1 10	,, ,,
♂	104	2 1	1 7½	H.M.S. 'Challenger.'
♀	23½	1 3	1 0	,, ,,

2. Three Crows from Fao, one of the telegraph-stations at the head of the Persian Gulf, presented by Mr. J. Huntley, in medical charge of the station, June 16th. These Crows apparently belong to an extreme form of the Hooded Crow (*Corvus cornix*), which I have never previously seen, the whole body-colour, except on the head and neck and wings, being of a pure white. Mr. Huntley writes to me as follows:—"A white crow, usually referred to as a wonder, especially in the East, is far from uncommon here. Doubtless you are familiar with its existence, though not a British bird. Deeming it a novelty, I have ventured to send three of them to your address, by kind favour of the Commander of the British Steam-Navigation Company's steamship 'Assyria,' which vessel is due in London about the 8th of June next. The bird is one bearing all the characteristics of the Hooded Crow, with the exception of its white feathers, which, from their resemblance to a surplice, have caused me to designate it the Chaplain Crow."

I propose to call this apparently new Crow the "Chaplain Crow" (*Corvus capellanus*), with the following characters:—

CORVUS CAPELLANUS, sp. nov. (Plate LXVI.)

Albus: capite undique, cum gutture producto, alis, cauda et tibiis nigris: plumis dorsi et pectoris linea mediana tenuissima nigra ornatis: rostro et pedibus nigris: forma C. cornicis *sed crassitie paulo majore et pedibus robustioribus.*

Hab. Arabia Turcica, ad ora Sinûs Persici.

3. Two Tiger cubs (*Felis tigris*), presented June 20th, by Dr. Marchant Jones. Dr. Marchant Jones has, at my request, most kindly procured this fine pair of Tiger cubs from the neighbourhood of Amoy, China, the Chinese form of this carnivore having been previously unrepresented in our series. Dr. Marchant Jones writes to me that these specimens were obtained at a place called Tang-wah, about 10 miles from Amoy, where the neighbourhood "abounds with tigers of a very large kind, bigger and with longer fur than the Indian variety."

4. A Gerrard's Squirrel (*Sciurus gerrardi*, Gray) from Cartagena, purchased June 24th. This Squirrel, which was described and figured by the late Dr. Gray, in the Society's 'Proceedings' in 1861 *, from specimens in the British Museum, is new to the Society's collection.

5. Four small Flying Phalangers of the genus *Belideus*, procured by Mr. Octavius C. Stone, F.R.G.S., during his recent expedition into the south of New Guinea, and received June 28th. These Phalangers are closely allied to *Belideus breviceps* and *B. ariel* of Australia, and, if different, are probably new to science. But it is not possible to distinguish them in the living state.

6. The female Sumatran Rhinoceros (*Rhinoceros sumatrensis*) deposited in the Gardens by Mr. C. Jamrach, on the 14th July 1875, and which has now been purchased for the sum of £600.

We have therefore now five Rhinoceroses in the collection, belonging to five different species, forming a unique and unparalleled series of these animals.

The registered additions to the Society's Menagerie during the month of July were 203 in number; of these 44 were acquired by presentation, 89 by purchase, 5 by exchange, 55 by birth, and 10 received on deposit. The total number of departures during the same period by death and removals was 91.

The most noticeable additions during the month were:—

1. A pair of the Black-backed Goose (*Sarcidiornis melanonota*) of India, purchased July 5th.

The arrival of these birds has afforded us the much-wished-for opportunity of comparing the Indian and American forms of *Sarcidiornis*, concerning the distinctness of which there has been much controversy.

Of the American form we have three examples, purchased at

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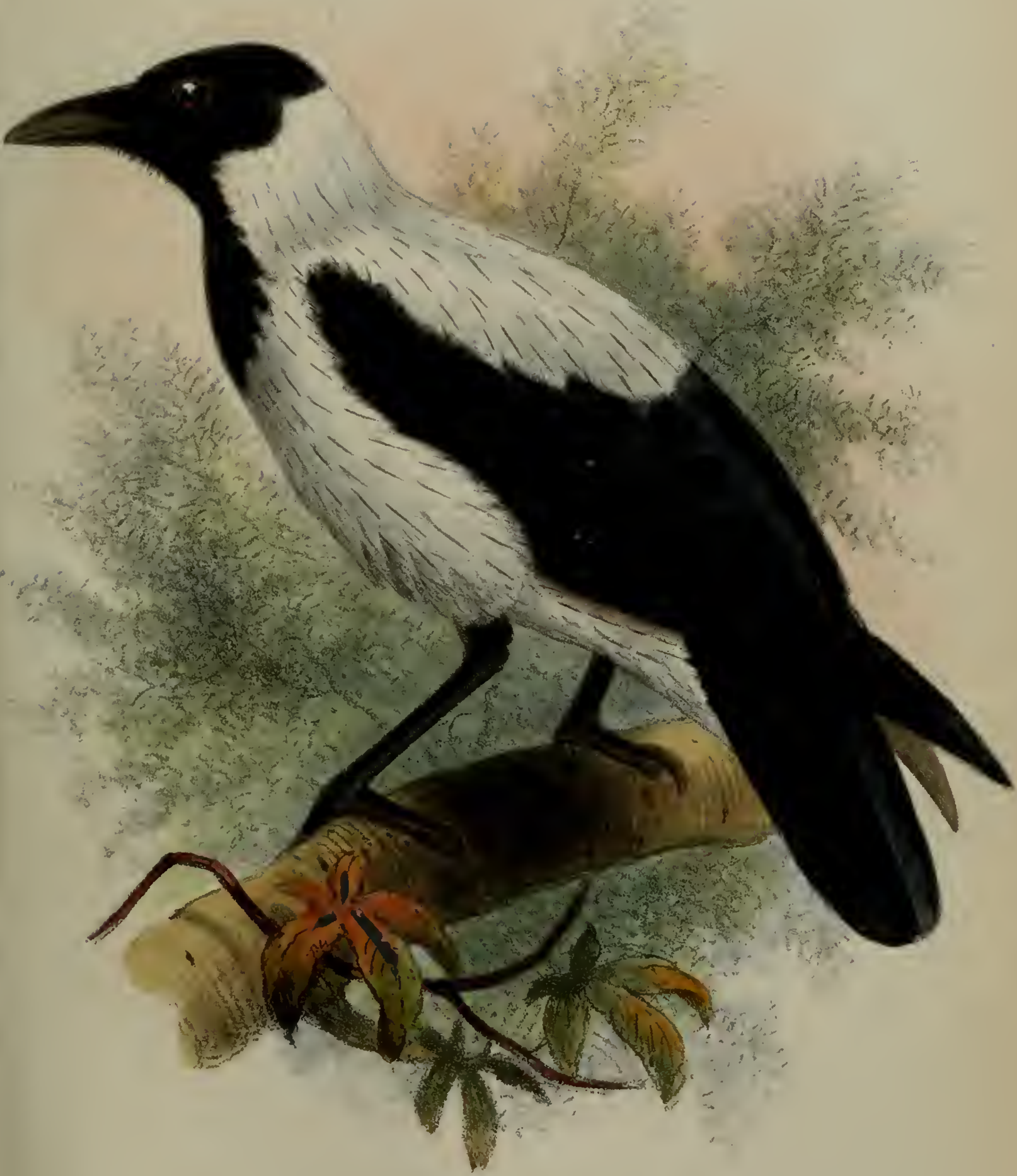
* See P. Z. S. 1861, p. 92, pl. xvi.



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CORVUS CAPELLANUS

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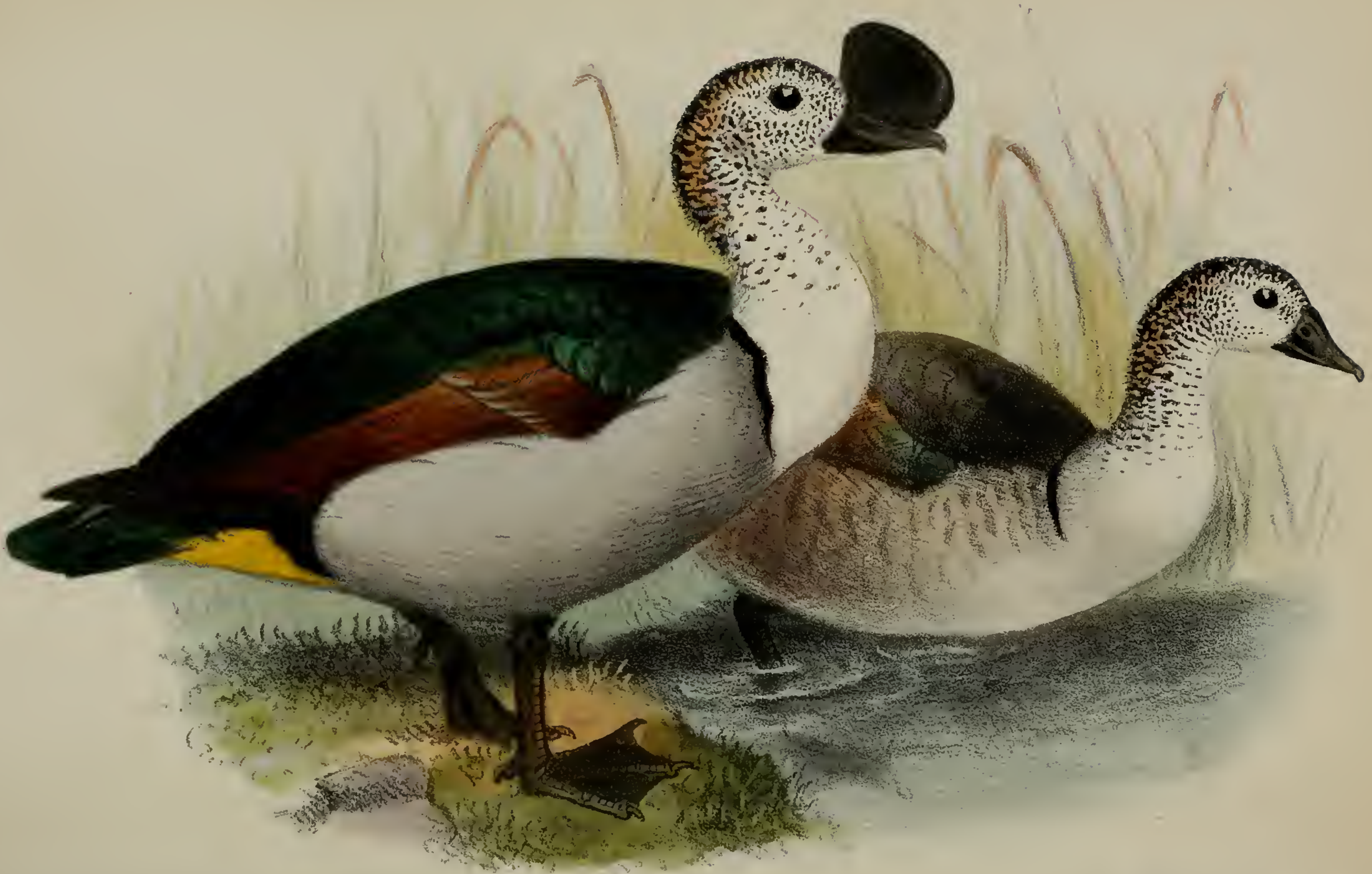

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SARCIDIORNIS MELANONOTA

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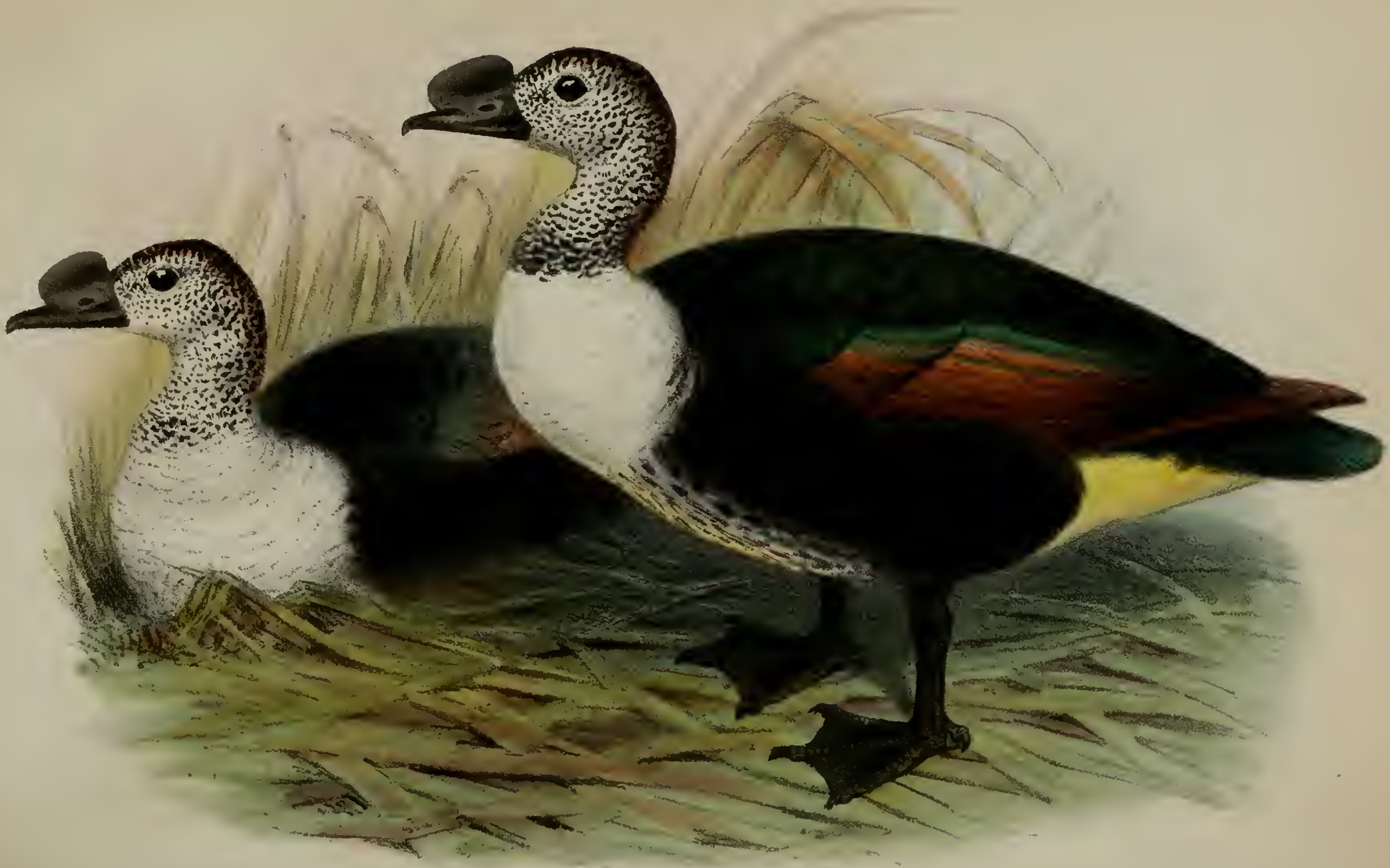

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SARCIDIORNIS CARUNCULATA.

Liverpool on the 6th of March last, and stated to have been received from Maranham. They consist of an adult male, and an adult and younger female. I exhibit Mr. Smit's sketches of the adult pair of the Indian birds (Plate LXVII.), and corresponding views of the American specimens (Plate LXVIII.), by which it will be seen that the two forms are readily distinguishable. In the Indian bird (*S. melanonota*)*, the flanks are white, surmounted by a curved black line coming from beneath the bend of the wing; the female is much inferior in size to the male, and has no caruncle on her bill. In the American bird, which, as Mr. Salvin and I have shown in our article on South-American Anatidæ (*anteà*, p. 377), should be termed *Sarcidiornis carunculata* (Licht.), the sexes are nearly equal in size, the female bears a comb on the head as well as the male, and the flanks are conspicuously black. I think, therefore, there can no longer be any question that the Indian and American *Sarcidiornithes* should stand as distinct species. What the African bird (*Sarcidiornis africana*, Eyton) is remains still to be seen.

2. A Bear, purchased July 21st, and stated to have been obtained out of a vessel coming from New Orleans, seems, although quite young, from its long claws and peculiar pale colour, to be referable to nothing else than the Grizzly Bear (*Ursus ferox*), of which we have had for many years no specimen in the Society's collection.

3. Two Crested Guinea-fowls (*Numida cristata*), hatched in the Society's Gardens July 27th, being, so far as I know, the first specimens of this fine bird bred in Europe. The eggs were taken from the bird and hatched by a common hen after thirty days' incubation.

The total number of registered additions to the Society's Menagerie during the month of August was 96; of these 42 were acquired by presentation, 28 by purchase, 14 by birth, and 12 were received on deposit. The total number of departures during the same period by death and removals was 81.

The most noticeable additions during the month were:—

1. A young example of the Raccoon-like Dog (*Nyctereutes procynides*), from China, presented by Captain Burgoyne, August 1st, being the second example of this rare and curious Carnivore that has reached us.

2. A fine adult male of the Grizzly Bear (*Ursus ferox*), imported into Liverpool from San Francisco, and purchased August 12th. This is perhaps the first undoubted example of this Bear that has of late years reached us, and gives us an opportunity of comparing this animal in its living aspect with large specimens of *Ursus arctos*, of which we have several in the collection. The most noticeable differences are the longer claws and the long hair down the front of the neck.

3. Three White-crested Laughing Thrushes (*Garrulàx leucolophus*), from Northern India, purchased August 15th. These have

---

* *Anas melanonota*, Forster, Zool. Ind. p. 42, tab. xi. (1781), ex *Oye de la Coromandel*, Buff. Pl. Enl. 937.

been placed in one of the large cages in the parrot-house, and make a fine and novel addition to the series of rarer Passeres.

4. A Bengal Pitta (*Pitta bengalensis*), purchased August 18th, being the first specimen of any species of this magnificent Asiatic genus of birds that has reached us alive.

5. Two Wattled Guans (*Aburria carunculata*), presented by Mr. L. Merino, August 29th. Mr. Merino informs me that these birds, which are the first examples of this form of Guan that have reached us, are from the State of Tolimá, U. S. of Columbia.

The total number of registered additions to the Society's Menagerie during the month of September was 105; of these 55 were acquired by presentation, 35 by purchase, 4 by exchange, 5 were bred in the Gardens, and 6 were received on deposit. The total number of departures during the same period by death and removals was 80.

The most noticeable additions during the month were as follows:—

1. A Slaty-headed Parrakeet (*Palæornis schisticeps*), purchased September 25th, being the first living example we have received of this North-Indian species, which is very rare in captivity.

2. A Rüppell's Spur-winged Goose (*Plectropterus rueppelli*), presented by M. J. M. Cornély, C.M.Z.S., September 28th. No example of this form of Spur-winged Goose has been living in the Gardens since 1860. The present specimen was until recently in the Zoological Gardens at Antwerp.

3. Four American Darters (*Plotus anhinga*), purchased September 29th. These birds are very acceptable, as we have recently lost the two specimens of this most interesting form that have previously lived in the Gardens.

I may take this opportunity of calling attention to the species of Muntjac doubtfully recognized by me in 1875 as *Cervulus micrurus* (P. Z. S. 1875, p. 422, pl. li. fig. 1).

The pair of this supposed species bred that year; and a young female was born on the 30th of July, 1875. In this the tail is longer than in the parents, but not so long as in the ordinary *Cervulus reevesi*.

They bred again this year; and a young male was born on the 30th ult. In this the tail is fully as long as in the true *C. reevesi*.

I have therefore come to the conclusion that the so-called *C. micrurus* has been founded on examples of *C. reevesi* with docked tails.

A letter was read from Dr. O. Finsch, C.M.Z.S., dated Saissan, S.W. Siberia, May 22, 1876, containing the subjoined remarks on the supposed existence of the wild Camel in Central Asia:—

"During my recent trip through Turkestan and the northern frontier of China I had the opportunity of collecting some notes relating to the existence of the wild Camel (*Camelus bactrianus*), which I hope will be of some interest to the members of the Society.

"When in St. Petersburg, Colonel Przewalsky had told me that he was sure of finding the Camel wild during his proposed new expedition, which, as I learned afterwards, is supported by extensive aid from the Russian Government. Colonel Przewalsky has been, as is well known, collecting very successfully in Thibet. I had the pleasure of seeing a good part of his collections in St. Petersburg, now incorporated in the fine Museum of the Academy of Sciences; and I must say that I have rarely seen more interesting collections. Colonel Przewalsky had the good fortune to bring home specimens of the wild Yak (*Bos grunniens*), which is indeed a most beautiful and huge animal, totally unlike the specimens in our Zoological Gardens. Besides, I was pleased to see fine specimens of *Kemas hodgsoni*, *Antilope picticaudata*, and, above all, especially as an ornithologist, examples of many fine and undoubtedly new species of birds.

"When in the Arcad Mountains, 150 versts above Semipalatinsk, where we made a successful hunt after *Ovis argali*, we became acquainted with Mr. Kamensky, a gentleman who is fitting out a large expedition, half mercantile and half scientific, to China, in order to open the route traversed by Colonel Lassnowsky from Pekin to the frontier of Russia by Saissan. After reaching this latter place by way of Tschugutscheck, conducted by Major Tichannoff, we obtained more notices as to the occurrence of the Camel wild. Mr. Harkloff, an intelligent merchant, who has long resided in Saissan, and has made many trips into Northern China, told me the following on this subject, mostly based upon the reports of native Tanguts, as Mr. Harkloff had never had the opportunity of seeing the wild Camel himself:—'The wild Camel has two humps; the size is nearly the same as that of the tame; but it is larger and higher on the legs. It is of a darker colour than the tame; and the white around the nose is much clearer and paler. The wild Camel is to be found 250 versts south-east from Saissan, in the district of Kabano (*i. e.* bloody hill), part of the desert of Gobi. In the spring they pair; and the time of gestation is the same as with the tame Camel. The Tanguts and Kirgizes hunt the wild Camel and eat its flesh; also they use the hair. The wild Camel is said not to be shy, and accordingly not difficult to obtain. Amongst the wild Camels live a species of Kulan, different from the common *Equus onager*, of a pale yellowish colour, which is known by the Tanguts under the name of "Surtaga."'

"Major Tichannoff had also the kindness to inquire on this subject of an intelligent and experienced Kirgiz, who reported as follows:—

"'The Kirgizes hunt and eat the wild Camel; it is not to be tamed. It lives in the western part of the High Gobi, called Kanaba, about 200 versts from Saissan.

"'According to an old legend, there was a rich Kirgiz, who had so many camels and horses in his possession that he was unable to take care of them. A great quantity escaped, the camels became wild, and the horses became Kulans.

"'The wild Camel is much larger, higher on the legs, and has a much finer and softer wool than the tame kind; it runs faster than the Horse; it is of a red-brown colour, darker than the tame. The weight is about 40 to 48 pud; and it requires four tame Camels to transport the body of a wild one. The voice is not so strong as that of the tame Camel. The female produces in February or the beginning of March, one calf, rarely two, and bears young every year, whereas the tame Camel brings forth only every two years. The flesh of the wild Camel is much appreciated by the Tanguts, and they hunt the animal with great zeal.'

"The Kirgiz who told us this assured us he had seen wild Camels himself when travelling with Tanguts through the Gobi to Kuldschen. He had often tasted the flesh, which he found sweeter than that of the tame.

"Mr. Harkloff, who takes great interest in natural history, has promised to send me the skin and skull of the wild Camel, as he was sure to be able to obtain them."

A letter was read from Mr. E. Pierson Ramsay, C.M.Z.S., containing the following notes on the habits of some living *Ceratodi* in the Australian Museum, Sydney :—

"You, among others, will perhaps be very glad to hear that I have at last succeeded in landing some *Ceratodi* alive here. At present they are doing well, and afford me great satisfaction in watching their movements in the large tank in which they are placed. I should like to write a long paper on them, but have too much on my hands to attempt it at present.

"It is now winter-time here, and very cold; so that the *Ceratodi* are not so lively as they might be, and appear to be too lazy to get out of the way when about to be handled.

"Their chief mode of progression is by waves of the tail, or by paddling with the pectoral fins alone (without either moving their posterior pair of fins or the tail). When at rest on the bottom of the tank, the pectorals are placed at nearly right angles to the body, the posterior fins lying parallel to the tail. If not disturbed, they will remain in this position for hours, and only when stirred up think it necessary to use their fins and tail at all. They then lash out with their great strong tail, and, turning sideways, squeeze in between some tufts of grass.

"I have tried to make them progress in only a few inches of water, but (as far as I have yet seen) without effect. They are exceedingly eel-like in their motions; and when going slowly along, the swaying of the great caudal fin gives them a serpentine course. I do not think they could go forward in a straight line unless swimming very fast or very slowly at the bottom: when they do this they do not use the tail at all, but depend on their pectoral fins.

"They are of a light olive-brown colour (some darker than others) above, and of a pale fleshy pink below. The eyes have a yellowish tinge when looked at sideways; but the iris is of a dull lead-brown colour. They feed on worms and water-weeds, *Lymnææ* and *Physa*, *Cyclas*, *Anodon*, &c.

"I am beginning to doubt their ever going *quite* out of the water to 'graze,' as has been reported, for the simple reason that they are too bulky to progress by their fins, and not long enough in the body to go eel-fashion. At any rate, they decidedly object to be kept any length of time out of the water: they put up with it for a few minutes, but then begin to plunge about so that I am always glad to get them back again into the water, fearing that they may injure themselves.

"I am indebted to Mr. B. Travis, of Maryborough, and to my brothers, Messrs. John and Percy Ramsay, for these specimens."

Mr. W. K. Parker, F.R.S., read a memoir "On the Structure and Development of the Skull in Sharks and Rays," of which the following is an abstract:—

"The materials for this paper have been kindly given me by my friends Mr. Henry Lee, and Mr. F. M. Balfour: the former obtained them from the aquarium at Brighton, and the latter from that at Naples.

"The illustrations of the Shark's skull are from embryos and adult specimens of the Lesser Spotted Dogfish (*Scyllium canicula*); the Skates were of three species, namely *Raia maculata*, *R. clavata*, and a species of *Pristiurus*; the smallest embryo of the Ray was of this last kind; this and the smallest *Scyllium canicula* were two thirds of an inch in length.

"The structure of the cranium proper and the facial arches has been worked out, from their first differentiation in the smallest embryos up to their adult condition. The Selachians present a curious and instructive problem in the skull, inasmuch as they only have the cartilage of which it is composed hardened superficially by tesseræ of calcified cell-patches, and the dermal bones ('placoid' grains and spines) are not modified in relation to the endoskeletal parts.

"Also we see that in these types the cranium and facial arches are more developed, as to mass in the former, and as to subdivision in the latter: the facial arches, all of which, behind the mouth, carry gills, are here almost typical; they make a useful standard by which to measure those of other Vertebrates.

"But the Selachians are of great interest also because of the free development in them of *external gills*. I find four on each side both in *Scyllium* and in *Pristiurus*, and even the spiracular cleft, the first postoral opening.

"These acquire a considerable size; and I find in *Raia maculata* *four more* papillæ are added, which do not grow outwards, but add to the number of folds in the 'pseudobranchiæ' of the mandibular suspensorium.

"The numerous external branchiæ of the hyoid and proper branchial arches are seen to be an early 'crop' of papillæ that are clavate, and long; they only contain a single branchial loop.

"The permanent gill-folds arise in the same manner as the external gills, but they are later in appearance; they are a second crop springing among the roots of the first.

"The *first*, or external gills, are buddings from the skin on the edge of the facial bar, close behind the raised opercular fold; the second upgrowth of filaments lies a little within the first; and on those branchial arches that give gill-plates to the back of one space and to the front of the next these rudiments are arranged in a double row, and look like the cogs of a wheel. The foremost arch with permanent gill-folds is the hyoid; and this, like the last branchial arch, can have but *one* series of plaits.

"The mouth of a Selachian is much modified; the mandibular bar, before it is segmented into the suspensorium and free mandible (Meckel's cartilage), grows not *upwards* to the auditory region, but forwards to the back of the nasal sacs.

"Then a joint is formed, and a knob on the upper piece fits into a hollow on the lower; the upper piece is the quadrato-palatine arcade or upper jaw, and, like the lower jaw, is articulated to its fellow of the opposite side by ligamentous substance.

"There is a free cartilage above the quadrate in the Skate, the 'spiracular cartilage,' which is the proper, but detached, apex of the suspensorium. In the Lesser Spotted Dogfish there is nothing but a ligament ascending from the quadrate; but in some of the Sharks there is a small ray, in others two or even three of these rays, which are largely developed in the hyoid and branchial arches, forming the skeleton of the interbranchial folds.

"These folds are made still more strong in the Sharks by external cartilages that run outside each septum; these 'extrabranchials' are not developed in the Skates.

"In both groups there is a complex system of 'labial cartilages,' helping to form the 'rostrum,' and to supply valves for the nasal openings; in the Sharks the *lips* also have two or three pairs of these 'extravisceraIs.'

"The three pairs of sense-capsules have tracts of cartilage between them; and these may be called the 'intercapsular' bands generally: the *interauditory* are the parachordals, the *interocular* the 'trabeculæ,' and the *internasal* are the nasal septum and trabeculæ cranii. These latter grow into the face as a rudimentary visceral arch; it is composed of a pair of lateral processes and the azygous prenasal rostrum—the axis of the *cutwater*, so large in the Skate and Saw-fish.

"On each side of the nasal sac in Skates and some Sharks there is another pair of visceral arches, the ethmo-palatines. These are distinct cartilages; in some Sharks, as in *Scyllium canicula*, they exist as exogenous rudiments.

"As a rule there are five clefts or facial slits besides the spiracle; *Hexanchus* and *Heptanchus* have more, as their name implies.

"One or two more interesting facts may be mentioned: the notochord acquires a cartilaginous sheath of its own, and in young embryos it is *beaded* in front; the 'investing mass,' or interauditory cartilaginous bands, runs on undivided far into the vertebral region."

This paper will be printed entire in the Society's 'Transactions.'

Referring to Canon Tristram's recent "Note on the Discovery of the Roebuck (*Cervus capreolus*) in Palestine," Professor Newton observed:—

"I write to make a slight correction of a statement published in the last part of the Society's 'Proceedings' (P. Z. S. 1876, p. 421). The remains of the Roe-Deer obtained on Mount Carmel were sent to the Museum of the University of Cambridge by the late Mr. C. F. Tyrwhitt-Drake, and not by Dr. Conder (as might be inferred from the Canon's expression); while the species was determined by Mr. J. W. Clark and Sir Victor Brooke, not by me. The remains, I may add, consisted of a nearly perfect skeleton and a damaged skin of a buck."

The following papers were read:—

1. Description of a new Species of Indian Snake of the Genus *Platyplectrurus* from the Wynad. By Lieut.-Col. Beddome, C.M.Z.S.

[Received September 26, 1876.]

Platyplectrurus hewstoni, sp. nov.

Brownish black above, each scale with an elongated white blotch on each side towards its posterior portion; belly white, with here and there irregular brown blotches; scales in fifteen rows—abdominals 123 and bifid, subcaudals five pairs (female); tail smooth, laterally compressed, ending in a horny smooth scale with a single point; snout rounded, nasals forming a suture behind the rostral; supraorbital shield present; eye small, in a large shield, pupil round; no postocular; vertical six-sided; a large temporal shield between the occipitals and the fourth labial; no median groove.

Hab. Manantoddy, in the Wynad, elevation 2700 feet (discovered by Dr. Hewston).

2. A Monograph of the Group *Molossi*.

By G. E. Dobson, M.A., M.B., F.L.S., &c.

[Received October 20, 1876.]

The group *Molossi* was formed by me for the reception of three genera of Emballonuridæ—*Molossus*, *Nyctinomus*, and *Cheiromeles**, which agree together in the possession of certain well-marked natural characters which at the same time distinguish them from all other genera of this family. These genera, especially *Molossus* and *Nyctinomus*, or sections of them, have received several different names, each of which, without regard to priority, has met with favour from different zoologists, scarcely any two appearing to agree in adopting the same term; so that the same species is described not infrequently under three or four different generic titles in the works of almost contemporaneous observers. This has, no doubt, been due in a great measure to the original very imperfect definitions of these genera, and also to the want of any trustworthy arrangement of the large number of new species subsequently described.

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* I omit *Mormopterus*, Ptrs., formerly included by me (Ann. & Mag. Nat. Hist. ser. 4, vol. xvi. p. 349, 1875) in this group as a distinct genus, as I have lately discovered a species quite intermediate between the single representative of *Mormopterus* and the species of *Nyctinomus*. The group *Molossi* corresponds to Prof. Peters's family *Molossi* (Monatsb. Akad. Berl. 1865, p. 258).

The first satisfactory attempt to arrange the species scientifically in a systematic form, and to determine their correct synonymy, was made by Prof. Peters, who published, in 1865, in a footnote to his paper on the Brazilian species of Bats described by Spix*, a short list of the genera, subgenera, and typical species of this group, with descriptions of a few new species, and subsequently, in the same journal, gave the results of his examination of the typical specimens from which Geoffroy's and Wagner's original descriptions were taken. Finding, however, that not half the species of *Molossi* now known are included in Prof. Peters's list, in which also no descriptions are given, and that much remained to be done before any thing approaching a correct list of the species and their synonymy could be made out, I was induced to give the subject my special attention; and the following monograph of the species is the result of my examination of a large number of specimens (including most of the types) preserved in the British Museum, in the museums at Leyden, Berlin, and Paris, and in the Indian Museum, Calcutta, as well as in several smaller collections.

The *Molossi* may be defined as Bats of the family Emballonuridæ with short legs and well developed fibulæ, with broad strong feet (whereof the first toe or the first and fifth are much thicker than the others) furnished with long, curved, prehensile hairs; with a thick fleshy tail produced far beyond the posterior margin of the interfemoral membrane; with flat broad heads, and obtuse, obliquely truncated muzzles terminated by the projecting margins of the nostrils; with generally large and broad, often united ears, and a short, sometimes minute, tragus; with a single pair of well developed upper incisors converging inwards and forwards.

In all the species the upper lip is very thick, and often deeply furrowed by vertical wrinkles, evidence of its great expansibility. The wings are very narrow, and the middle finger very long, its metacarpal bone in most species slightly exceeding the total length of the last finger. The first phalanx of the middle finger is short, less than half the length of the metacarpal bone, on the dorsal surface of which it is folded forwards in repose. The interfemoral membrane sheathes the base of the tail, and is movable at the will of the animal backwards or forwards upon it, thus increasing or diminishing its surface.

The great length and narrowness of the wings indicate rapid flight; and the power possessed by these Bats of varying the extent of surface of the interfemoral membrane must confer upon them great dexterity in quickly changing the direction of their flight, as when obliged to double in pursuing their swiftly flying insect prey; while the extremely expansible lips evidently aid them especially in capturing during rapid flight and in maintaining their hold on the large round-bodied Coleoptera. Of all Bats the *Molossi* appear especially suited by their peculiar conformation for capturing the most rapidly flying insects, which, no doubt, form the greater portion of their food. Their large and very strong acutely tubercular teeth would enable them to crush with ease the hard armour of the larger Coleoptera.

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* Monatsb. Akad. Berlin, 1865, p. 573.

Synopsis of the Genera of Molossi.

a. First toe much larger and thicker than the other toes and separable from them; ears quite separate.
  a′. Premaxillary bones united; upper incisors very strong, close together in front........................ 1. *Cheiromeles*, p. 704.
b. First and fifth toes much thicker than the other toes; ears united or close together by their inner margins.
  b′. Premaxillary bones united; upper incisors close together in front .... 2. *Molossus*, p. 705.
  c′. Premaxillary bones separate or united by cartilage only; upper incisors separate in front .... 3. *Nyctinomus*, p. 716.

The genus *Cheiromeles* is represented by a single species only, which, as I have previously remarked*, appears to be more closely allied to *Molossus*, which is restricted to America, than to *Nyctinomus*, of which several species inhabit the same countries with it.

The genera *Molossus* and *Nyctinomus* are very closely allied, some species, as *Molossus glaucinus*, Wagner, and *M. bonariensis*, Peters, forming the connecting links between them†. Nevertheless I retain these genera distinct, as they are convenient for grouping the species, and partly correspond to their geographical distribution, the species of *Molossus* being confined to America, while those of *Nyctinomus* are found in both hemispheres.

These genera have been divided into several subgenera, which depend on slight differences in dentition and in the form of the ear-conch and tragus. But so many perfectly intermediate forms exist that it is impossible to subdivide *Molossus* and *Nyctinomus*, which, indeed, as I have remarked above, may come to be regarded hereafter as subgenera only. Thus *M.* (*Promops*) *longimanus* resembles *M. rufus* (the representative of the subgenus *Molossus*) closely in the form of the tragus, and in the obtuse not obliquely truncated muzzle; and *M.* (*Promops*) *nasutus*, relegated to the subgenus *Promops* on account of its dentition, in all other respects is much more closely allied to *M. rufus*, with which it agrees in the peculiar form of the antitragus and tragus, and even in the distribution of the fur; while *M. rufus*, which differs from all other species in dentition, shows its close affinity to the representatives of the subgenus *Myopterus* in the perfectly similar form of its antitragus, and in the shape of its muzzle.

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* Monograph of the Asiatic Chiroptera, p. 177.

† Should the discovery of species even more intermediate than these render it necessary at any future time to unite the genera *Molossus* and *Nyctinomus*, the former name, which has priority, must be used for the single genus.

The subgenus *Mormopterus* is distinguished from *Nyctinomus* by the absence of the first minute upper premolars, and by the distinctly separate ears; but *N. norfolcensis*, Gray, is quite intermediate, agreeing with *Nyctinomus* in dentition, and in other respects with *Mormopterus*; and the discovery of *N. albiventer*, Dobson (described further on), adds another intermediate form*.

Genus CHEIROMELES.

Cheiromeles, Horsfield, Zool. Researches in Java, 1824; Temminck, Monogr. Mamm. ii. p. 345; Dobson, Monogr. Asiatic Chiroptera, p. 177, 1876.

Ears separate, as in *Taphozous*; extremity of the muzzle projecting considerably beyond the lower jaw; lips smooth, not grooved by vertical wrinkles; first toe much larger than the others, and separable from them.

Dentition.—Inc. $\frac{2}{2}$, C. $\frac{1-1}{1-1}$, Pm. $\frac{1-1}{2-2}$, M. $\frac{3-3}{3-3}$.

Premaxillary bones well developed, conjoined, supporting two strong incisors.

CHEIROMELES TORQUATUS.

Cheiromeles torquatus, Horsfield, *l. c.*

Dysopes cheiropus, Temm. *l. c.* i. p. 218, pl. 17.

Cheiromeles caudatus, Temm. *l. c.* ii. p. 348, pl. 66.

Ears shorter than the head, triangular, with narrowly rounded tips; the inner margin of the ear-conch papillate along upper half as in some species of *Taphozous*; antitragus distinct, rounded; tragus very small, the inner margin not developed, the outer with a small projection near the base. Muzzle long, obliquely truncated,

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* The following is a synopsis of the characters of these subgenera:—

Synopsis of Subgenera of Molossi.

Gen. MOLOSSUS.	
a. Ears more or less united.	
a′. Premolars $\frac{2-2}{2-2}$; upper incisors with diverging summits, and with their broad bases close to the canines	*Promops*, Gervais.
b′. Premolars $\frac{1-1}{2-2}$; upper incisors parallel by their inner margins, their bases close to the canines	*Molossus* (Geoffr.), Peters.
b. Ears distinctly separate; upper incisors with diverging summits, their bases removed from the canines by a diastema	*Myopterus*, Geoffr.
Gen. NYCTINOMUS.	
a. Ears very close or united together; upper lip deeply grooved by vertical wrinkles; premolars $\frac{2-2}{2-2}$	*Nyctinomus* (Geoffr.), Peters.
b. Ears distinctly separate; upper lip slightly wrinkled; premolars $\frac{1-1}{2-2}$	*Mormopterus*, Peters.

the extremity projecting very considerably beyond the lower jaw. An enormous gular sac extends half round the neck beneath. Into this sac the oily secretion of glands situated between the internal origins of the pectoral muscles is discharged, in males by a series of small pores collected in two circular slightly elevated patches, in females by a single large orifice.

First toe very thick, thinly covered with long curved hairs on the outer side; this toe is separated from the others like a thumb, and is probably opposable to them. Wing-membrane from the middle of the tibia, and from the sides of the back near the spine. A deep axillary pouch is formed, in both male and female, by an extension of a fold of skin, derived from the thick integument covering the breast and sides of the body, to the inferior surface of the humerus, and, longitudinally, to the femur. In the anterior part of this pouch, on the side of the body, behind the axilla, the mamma is placed.

Tail very thick and long, projecting more than half its length beyond the short interfemoral membrane.

Integument very thick and almost quite naked, with strong plications along lines of flexure and extension; the back is quite naked; but a collar of very short thinly spread hairs nearly surrounds the neck.

Upper incisors strong, placed close together, their extremities converging inwards; the single upper premolar large and tricuspidate; first lower premolar minute, wedged in in the space between the canine and second premolar, which are close together; the last upper molar less than half the size of the second molar.

Length: head and body 5″·3; tail 2″·6; head 1″·8; ear 1″·2, tragus 0″·15; forearm 3″·1; thumb 0″·8; second finger 7″; third finger 5″·6; fourth finger 3″·1; tibia 1″·4; foot and claws 1″·05.

Hab. Malay peninsula (Pinang, Singapore), Sumatra, Java, Borneo.

Genus MOLOSSUS.

Molossus, Geoffroy, Annal. du Mus. vi. (1805), p. 154; Peters, Monatsb. Akad. Berl. 1865, p. 574.

Dysopes, Illiger, Prodr. Syst. Mammal. (1811), p. 122.

Ears close together, or united at the bases of their inner margins; tragus very short, sometimes minute; extremity of the muzzle broad, obtuse, or very obliquely truncated; lips smooth or with very indistinct vertical wrinkles; first and fifth toes much thicker than the others, the backs of all the toes with long curved hairs.

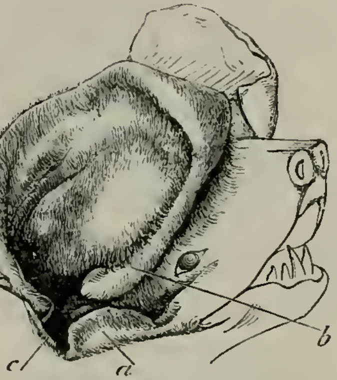
Dentition.—Inc. $\frac{2}{2}$ or $\frac{2}{4}$, C. $\frac{1-1}{1-1}$, Pm. $\frac{1-1}{2-2}$ or $\frac{2-2}{2-2}$, M. $\frac{3-3}{3-3}$.

Premaxillary bones well developed, united; upper incisors strong, their inner margins close together in front; first minute upper premolar generally external to the tooth-row or absent; first lower premolar half the size of the second, standing in the tooth-row (except in *M. rufus*, where it is partly internal and concealed by the closely approximated second premolar).

Range.—Tropical and subtropical regions of America.

In the following analytical table of the species, and in the subsequent descriptions, reference is often made to the different parts of the ear-conch shown and named in the woodcut below, which represents, in half-outline, the head of *Molossus glaucinus*.

Fig. 1.



Head of *M. glaucinus*.

a, Antitragus; *b*, keel of the ear-conch; *c*, notch behind antitragus.

Synopsis of the Species.

I. Muzzle obtuse, rounded in front; lips smooth, not wrinkled; tragus triangular or linear.
  a. Antitragus circular, as high as long.
    a′. Tragus triangular with a broad base; inner margins of the ears arising by separate points of origin; inc. $\frac{2}{4}$, pm. $\frac{1-1}{2-2}$.
      a″. Ears obtusely pointed, forearm 1″·2......... 1. *M. temminckii*, p. 707.
      b″. Ears rounded above.
        a‴. Centre of breast and abdomen white; forearm 1″·35............................ 2. *M. planirostris*, p. 707.
        b‴. Centre of breast and abdomen not different from sides; forearm 1″·7...... 3. *M. brachymeles*, p. 708.
    b′. Tragus linear, subacutely pointed, inner margins of the ears arising from the same point or very close together.
      c″. Inc. $\frac{2}{2}$, pm. $\frac{1-1}{2-2}$ ... . 4. *M. rufus*, p. 709.
      d″. Inc. $\frac{2}{4}$, pm. $\frac{2-2}{2-2}$ .... 5. *M. nasutus*, p. 711.
  b. Antitragus half-oval or half-cordate, longer than high, tragus linear; inc. $\frac{2}{4}$, pm. $\frac{2-2}{2-2}$ .... 6. *M. abrasus*, p. 712.

II. Muzzle very obliquely truncate, its superior and external front margins formed by the sharply cut cartilaginous rim of the nostrils, lips smooth or very slightly wrinkled; tragus quadrate; inc. $\frac{2}{4}$, pm. $\frac{2-2}{2-2}$.
  a. Ears longer than the head; gular sac large; first upper premolar external .... 7. *M. perotis*, p. 713.
  b. Ears shorter than the head, gular sac small; first upper premolar in the tooth-row.
    a′. Upper lip smooth; forearm 2″·3 .... 8. *M. glaucinus*, p. 714.
    b′. Upper lip slightly wrinkled; forearm 1″·8 ... 9. *M. bonariensis*, p. 715.

Inc. $\frac{2}{4}$; *Pm.* $\frac{1-1}{2-2}$; *ears separate*; *tragus triangular.*

(Subgen. MYOPTERUS, Geoffr.)*

1. MOLOSSUS TEMMINCKII.

Dysopes temminckii, Lund, Burmeister, Thiere Brasiliens, p. 72 (1854).

Molossus (*Molossops*) *temminckii*, Peters, Mon. Akad. Berl. 1865, p. 575.

Ears rather small, pointed, their inner margins arising from the forehead by separate points of origin: antitragus circular; tragus short and obtuse, with a broad base. Extremity of the nose slightly prominent, broad, and flat, with an obtuse projection between the nasal orifices, but without arched ridges above them. Lips smooth, with a few straight hairs.

Fur, above, reddish-brown at the extremities, the base of the hairs yellowish-white; beneath, similar, but paler. Integument and membranes dark throughout.

Calcanea very long, reaching almost to the tail.

Length: head and body 1″·5; tail 1″·0, tail free from membrane 0″·5; forearm 1·″2; calcaneum 0″·65.

Hab. Brazil (Lagoa Santa).

The above description has been taken from the original description by Burmeister, as I have not seen the type.

2. MOLOSSUS PLANIROSTRIS.

Molossus (*Molossops*) *planirostris*, Peters, Mon. Akad. Berl. 1865, p. 575.

Ears much shorter than the head, their inner margins arising from the sides of the superior surface of the face above and in front of the eyes, their points of origin widely separate; upper three fourths of inner and outer margin regularly convex, forming almost an arc of a circle; keel of the ear-conch very slightly developed; tragus short, triangular, with a broad base, acutely pointed, inner margin straight; antitragus large and round, very similar in shape and size to that of *M. obscurus* (p. 710), but its base is somewhat broader. Muzzle flat, smooth and naked above, extremity obtuse, not obliquely truncated; the margins of the nasal apertures not prominent, placed high above the margin of the upper lip; lips smooth, not wrinkled. A distinct, but not large, gular sac in ♂, rudimentary or absent in ♀. Wings from the distal third of the tibiæ.

Fur very short; above, dark-brown, the bases of the hairs white; beneath, along the sides of the body, brown; the chin, neck, and a broad longitudinal band on the chest and abdomen yellowish-white. The fur of the body extends upon the wing-membrane, above and beneath, nearly as far outwards as a line drawn from the middle of the humerus to the middle of the femur, the remainder of the membrane nearly naked; a few fine hairs appear behind the distal half of the forearm on the upper surface, and clothe the proximal third of the fifth metacarpal bone; beneath, the wings are quite naked, except along the sides of the body.

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* These subgenera are indicated here, and at different places further on, for convenience only, in order to avoid repeating the dental formula when describing each species, not for the purpose of pointing out natural subdivisions of the genera.

Upper incisors long, the centres of their inner sides close together, their bases and summits separated; lower middle incisors slender, with grooved crowns; outer incisors very small, between the middle incisors and the canines, and not grooved. First upper premolar large, close to the canine, with a large anterior and internal basal cusp, and a smaller cusp posterior and external. Lower canine on each side with a small internal basal cusp, which nearly touches its fellow of the opposite side.

Length (of an adult ♂): head and body 2″·3; tail 1″·2; tail free from membrane 0″·4; head 0″·85; ear 0″·6, tragus 0″·15 × 0″·1; forearm 1″·85; thumb 0″·25; second finger—metacarp. 1″·35, 1st ph. 0″·6, 2nd ph. 0″·65; third finger—metacarp. 1″·25, 1st ph. 0″·5, 2nd ph. 0″·2; fourth finger—metacarp. 0″·85, 1st ph. 0″·4, 2nd ph. 0″·15; tibia 0″·4; foot and claws 0″·3.

Hab. Brazil (Buenos Ayres, Barra do Rio Negro); British Guiana (Berbice).

The next species is probably identical with *Myopterus daubentonii*, Geoffroy (Descr. de l'Egypte, ii. p. 113), with which it agrees very closely in the length of its skull, the only remnant of the type of that species, which therefore cannot be accurately determined. Of this skull Prof. Peters (MB. Akad. Berl. 1869, p. 402) has given the following measurements:—"length 0″·85; width across zygomatic arches 0″·5; length of upper tooth-row (not including incisors) 0″·32; length of lower tooth-row 0″·35."

3. Molossus brachymeles.

Molossus (*Molossops*) *brachymeles*, Peters, Monatsb. Akad. Berlin, 1865, p. 575.

Appears to differ from the preceding species only in being conspicuously larger, in the different colouring of the fur of the under surface, and in its slightly different distribution.

Fur above dark brown, the base of the hairs paler; beneath reddish brown. The antebrachial membrane is covered with a small patch of fur along the forearm, and the wing-membrane between the metacarpal bones of the last two fingers and the forearm. Beneath, the fur of the body extends upon the wing-membrane along the sides of the body only; the remaining parts are quite naked.

Total length 4″·0; head 0″·9; ear 0″·6; forearm 1″·7; middle finger 3″·4; tibia 0″·5; foot 0″·46.

Hab. Peru.

The above is taken from Prof. Peters's description of the only specimen known, a stuffed skin, preserved in the Neuchâtel Museum.

Inc. $\frac{2}{2}$; *pm.* $\frac{1-1}{2-2}$; *ears close together, tragus linear.*

(Subgen. MOLOSSUS, Ptrs.)

4. MOLOSSUS RUFUS.

Molossus rufus, Geoffroy, Ann. du Mus. vi. (1805), p. 154; Gervais, Expéd. de Castelnau, Zoologie, p. 58, pl. xii. figs. 4 and 4 *a* (skull and teeth); Peters, Monatsb. Akad. Berl. 1865, p. 575.

Molossus ursinus, Spix, Sim. et Vespert. Brasil. (1823), p. 58, pl. xxv. fig. iv.

Dysopes alecto, Temminck, Monogr. Mammal. i. p. 231 (1835–41).

Dysopes holosericeus et *albus*, Natt., Wagner, Wiegm. Archiv, 1843, p. 368. (*Vide* Peters, Mon. Akad. Berl. 1866, p. 22.)

Dysopes ursinus, Wagner, Suppl. Schreb. Säugeth. v. p. 709 (1855).

Ears much shorter than the head, their inner margins arising close together, slightly in front of a line drawn between the eyes, from a point on the forehead, from which a sharp ridge passes forwards on the face to the nose: outer and inner margins of the ear-conch convex, forming almost a regular semicircle; antitragus circular, arising by a narrow base from which it expands equally anteriorly and posteriorly; tragus minute, linear, acutely pointed. Extremity of the muzzle obtuse, rounded, projecting beyond the mandible; the nasal apertures directed forwards and slightly outwards, separated by a considerable interval (which is covered with short erect hairs dilated at their extremities) from the margin of the lip, beyond which the extremity of the nose scarcely projects; lips thick, smooth, without wrinkles.

In the male, the opening of a large glandular sac directed forwards is found opposite the anterior extremity of the sternum; in the female this sac is much smaller.

Wings from the ankles. Fur very short, deep reddish brown above and beneath. The face and ears are nearly naked. On the upper surface, the wing-membrane is covered as far as a line drawn from the middle of the humerus to the middle of the femur, and short fur extends upon half the antebrachial membrane, and behind the distal two-thirds of the forearm to the carpus, covering also the angle between the fourth and fifth metacarpal bones; behind, the base of the interfemoral membrane also is covered. Beneath, the fur of the body extends upon the wing-membrane almost as far outwards as a line drawn from the elbow to the knee; and a band passes outwards behind the elbow, becoming gradually wider towards the carpus, till it occupies a space there extending from the forearm to the middle of the metacarpal bone of the fourth finger, beyond which it passes and occupies the angle between it and the metacarpal of the third finger, being limited in its extent outwards by the muscular band extending to the wing-membrane in this position; a small space between the proximal extremity of the fifth metacarpal and the short muscular band extending from the end of the forearm to the wing-membrane is naked.

Upper incisors moderately long and acutely pointed, converging inwards and forwards, their bases touching the canines, their inner sides approximated; at the outer side of the base of each tooth, a small blunt projection from the cingulum which touches the canines; the single upper premolar large, and close to the canine; lower incisors two, bifid, in front of the closely approximated canines which have each a broad internal basal cusp; first lower premolar scarcely half the size of the second, which lies so close to it as to be with difficulty distinguished in recent specimens as a separate tooth, its outer and posterior side is partially covered by the obliquely directed cingulum of the second premolar; last upper molar narrow, less than half the size of the antepenultimate molar.

Length (of an adult male): head and body 3″·5; tail 2″·0; head 1″·2; ear 0″·65, tragus 0″·1; forearm 2″·1; thumb 0″·4; second finger—metacarp. 2″·0, 1st ph. 1″·05, 2nd ph. 1″·15; third finger—metacarp. 1″·95, 1st ph. 0″·9, 2nd ph. 0″·2; fourth finger—metacarp. 1″·3, 1st ph. 0″·55, 2nd ph. 0″·25; tibia 0″·7; foot and claws 0″·5.

Hab. Mainland of Tropical America (Rio de Janeiro, Pernambuco, Para, Rio Negro, Dutch Guiana, Oaxaca).

Subspecies *a*. MOLOSSUS OBSCURUS.

Molossus obscurus, Geoffroy, Annal. du Mus. vi. (1805), p. 154; Gervais, *l. c.* fig. 5 (skull).

Molossus longicaudatus, Geoffroy, *l. c.*

Molossus acuticaudatus, Geoffroy (*vide* Peters, Mon. Akad. Berlin, 1869, p. 402).

Dysopes velox, Natt. Temminck, Monogr. Mammal. i. p. 234 (1836); Wagner, Suppl. Schreb. Säugeth. i. p. 476 (1844), v. p. 712 (1855); Burmeister, Thiere Brasiliens, Th. i. p. 71 (1854).

Molossus velox, Gray, Mag. Zool. Bot. ii. (1838), p. 501.

Molossus fuliginosus, Gray, *l. c.*

Molossus tropidorhynchus, Gray, Ann. Nat. Hist. 1839, p. 5.

Dysopes olivaceo-fuscus, Natt. Wagner, Abh. Münch. Akad. v. p. 202 (1844). (*Vide* Peters, *l. c.* 1866, p. 22.)

Dysopes fumarius, Burmeister, *l. c.* p. 71.

Molossus fumarius, Tomes (non Spix), P. Z. S. 1861, p. 68.

Quite similar to *M. rufus* in structure, but much smaller, the forearm constantly measuring 1″·7 or less, as compared with 2″·1.

The fur covering the wing-membrane between the humerus and forearm extends somewhat further outwards; and the upper incisors are closer together.

It will probably be found hereafter, when a sufficiently large number of specimens are available for examination, that the above-named differences are unimportant, and that the only real difference consists in size.

Length (of an adult ♂): head and body 2″·7; tail 1″·6; head 0″·85; ear 0″·55, tragus 0″·08; forearm 1″·65; thumb 0″·3; second finger—metacarp. 1″·6, 1st ph. 0″·75, 2nd ph. 0″·6; third finger—metacarp. 1·55, 1st ph. 0″·65, 2nd ph. 0″·15; fourth finger

—metacarp. 0″·95, 1st ph. 0″·48, 2nd ph. 0″·2; tibia 0″·55; foot and claws 0″·4.

Hab. Tropical America and its islands; apparently generally distributed. Found in Peru at an elevation of 9000 feet.

Inc. $\frac{2}{4}$; *pm.* $\frac{2-2}{2-2}$; *ears close together or united; tragus subacute or quadrate.* (Subgen. PROMOPS, Gervais.)

5. MOLOSSUS NASUTUS.

Molossus nasutus, Spix, Simiar. et Vespert. Brasil. p. 58, pl. xxxv. fig. vii. (1823); Peters, Mon. Akad. Berl. 1865, p. 578, pl. fig. 4 (skull).

Molossus fumarius, Spix, *l. c.* figs. v. and vi.

Promops ursinus, Gervais (non Spix), Expéd. de Castelnau, Zoologie, p. 59, pl. xii. figs. 3, *3a* (dentition) (1855).

Ears much shorter than the head; laid forwards, the inner margin of the conch extends slightly further than halfway between the eye and end of the muzzle; inner margins less than one tenth of an inch apart at their bases, uniting on the muzzle in a prominent rounded ridge which ends abruptly at a short distance behind and above the nostrils; inner and outer margins of the ear-conch continuous, forming almost an an arc of a circle; ear-keel short, thickened, but not expanded beneath, clothed posteriorly with short hairs; antitragus circular with a narrow base, as in *M. rufus*, but thickened and expanded above and posteriorly, so that its very convex superior and posterior margin projects backwards considerably beyond its base; tragus very small, as in *M. rufus*, with a minute projection at the outer side of its base. Muzzle very obtuse in front, nearly vertically truncated; nostrils directed forwards and slightly outwards, connected above by an ill-defined ridge which does not extend downwards between them, the wide space between the nostrils and the margin of the upper lip occupied by a quadrilateral patch of thickly spread short hairs, the sides of the muzzle almost naked. A large gular sac in ♂, as in *M. rufus*.

Wings from the ankles; interfemoral membrane deep, including quite three fourths of the tail.

Fur moderately long, but conspicuously longer than in *M. rufus*, dark brown above, paler beneath, the base of the hairs whitish on both surfaces. On the upper surface, a band of short fur commences in a narrow line at the beginning of the middle third of the forearm, increases in width outwards so as to cover the proximal third of the fifth metacarpal bone and fourth of the fourth metacarpal, occupying also the portion of wing-membrane between; beneath, the wing-membrane between the humerus and femur is thickly covered, and a band of fur, 0″·3 wide, extends outwards behind the forearm to the fifth metacarpal bone and to the wing-membrane beyond it, covering half the bone.

First upper premolar very small, quite external to the tooth-row.

Length (of an adult ♂ preserved in alcohol): head and body 3″·1; tail 2″·1, tail free from membrane 0″·7; head 0″·9; ear 0″·6, tragus 0″·08 × 0″·02; forearm 2″·0; thumb 0″·3; second finger—metacarp. 2″·05, 1st ph. 0″·95, 2nd ph. 0″·95; third finger—metacarp. 2″·0, 1st ph. 0″75, 2nd ph. 0″·15; fourth finger—metacarp. 1″·2, 1st ph. 0″·5, 2nd ph. 0″·22; tibia 0″·7; foot and claws 0″·4.

Hab. Brazil; Central America (Guatemala).

The above description has been taken from an adult male specimen obtained by Mr. Salvin in Guatemala, and preserved in alcohol in the collection of the British Museum. The only other specimens known are imperfectly preserved skins, the types of *M. nasutus,* and *M. fumarius,* Spix, of which the first intelligible description was published by Dr. Peters.

This species is quite intermediate between *M. rufus* (Subg. *Molossus*) and *M. abrasus* (Subg. *Promops*), agreeing with the former in the form of the ear, and even in the distribution of the fur, with the latter in the form and number of the teeth.

6. MOLOSSUS ABRASUS.

? *Molossus ater,* Geoffroy, Annal. du Mus. vi. (1805) p. 153.

Dysopes abrasus, Temminck, Monogr. Mammal. i. p. 232, ii. p. 356 (1835–41); Wagner, Suppl. Schreb. Säugeth. i. p. 475 (1844), v. p. 710 (1855).

Dysopes longimanus, Wagner, Wiegm. Archiv, 1843, p. 367; Suppl. Schreb. Säugeth. 1855, p. 709.

Dysopes leucopleura, Wagner, *l. c.*; Burmeister, Thiere Brasiliens, p. 73 (1854).

Molossus abrasus, Peters, Mon. Akad. Berlin, 1865, p. 574.

Ears much shorter than the head, but conspicuously larger than in *M. rufus,* united by their bases only on the muzzle at a point equally distant from the anterior commissure of the eyelids and the nostrils; outer and inner margins of the ear regularly convex, forming together almost a perfect arc of a circle; antitragus half-cordate, with a broad base, separated behind by a deep notch; keel of the ear-conch well-developed, thickened and expanded externally in lower half; tragus minute, linear, subacutely pointed, slightly larger than in *M. rufus,* but with a broad base.

Muzzle obtuse, nasal apertures directed forwards and slightly outwards, the end of the nose scarcely projecting beyond the margin of the upper lip, which is separated from the margin of the nostrils by a space less wide than in *M. rufus*; the external margins of the nostrils more prominent than in that species, and continued upwards and inwards above the nasal apertures, and downwards between them in a conjoined ridge to the margin of the lip; the upper margin of the nasal disk thus formed on each side is finely and evenly toothed, and the internasal ridge covered with short spoon-shaped hairs, similar to those forming a broad patch between the nostrils and upper lip in *M. rufus,* but strictly limited to this ridge; the margin of the upper lip in front is fringed with straight hairs.

Wings from the ankles, or from the tibiæ slightly higher up. Gular sac distinct in ♂, rudimentary in ♀.

Fur short, and intensely black above and beneath. The muzzle in front of the ears is nearly naked, also the inferior surface of the lower jaw. The fur of the body extends upon the wing-membrane above almost as far as a line drawn from the middle of the humerus to the knee-joint; beneath, as far as a line drawn from the middle of the humerus to the middle of the femur; a small patch of fur appears on the upper surface of the antebrachial membrane near the forearm; and the base of the interfemoral is covered; but the remainder of the membranes are naked.

Upper incisors close together, parallel; lower incisors very small, bifid, the outer incisor on each side concealed between the middle incisor and the base of the canine; inner basal cusps of the lower canines almost touching behind the incisors as in *M. rufus*. First upper premolar very small, scarcely raised above the gum, and scarcely visible without aid of a lens, in the small space between the canine and second premolar, but close to the outer margin of that space; in another specimen, this small premolar is larger, and outside the tooth-row, though a narrow space still intervenes between the canine and the second premolar.

Length (of an adult ♀): head and body 3″·25; tail 1″·8, tail free from membrane 0″·9; head 1″·15; ear 0″·8, tragus 0″·12; forearm 2″·45; thumb 0″·45; second finger—metacarp. 2″·4; 1st ph. 1″·1, 2nd ph. 1″·3; third finger—metacarp. 2″·3, 1st ph. 0″·9, 2nd ph. 0″·4; fourth finger—metacarp. 1″·2, 1st ph. 0″·8, 2nd ph. 0″·35; tibia 0″·7; foot and claws 0″·4.

Hab. Brazil (Mato Grosso, Barra do Rio Negro); Surinam; Peru.

Prof. Peters has very kindly sent me a specimen of this species which he had determined by direct comparison with the type in the Leyden Museum. The absence of a gular sac, mentioned by Temminck, is due to the immature condition of the specimen from which the original description was taken.

7. Molossus perotis.

Dysopes perotis, Wied, Beitr. Naturg. Brasil. ii. (1825), p. 227; Wagner, Suppl. Schreb. Säugeth. i. p. 473, v. p. 708; Burmeister, Thiere Brasiliens, p. 68 (1854).

Dysopes rufus, Temm. (non Geoffr.), Monogr. Mammal. i. p. 230 (1835–41).

Dysopes (*Molossus*) *gigas*, Peters, Mon. Akad. Berl. 1864, p. 381.

Molossus (*Promops*) *perotis*, Peters, *l. c.* 1865, p. 574.

Ears very large, united in front; laid forwards, they extend beyond the extremity of the nose; the outer and inner margins of the ear-conch regularly circular; antitragus much longer than high, convex, separated posteriorly by an angular notch, tragus quadrate with rounded angles, no prominent lobule at the base of the outer margin; keel of the ear-conch well developed, thickened and flattened externally. Muzzle very obliquely truncated, the extremity of the nose projecting much beyond the retracted upper lip, which is also concealed by a fringe of short hairs; nasal apertures directed forwards and downwards; the cartilaginous sharply cut edges of the nostrils projecting laterally and above, terminating the muzzle in front; sides of the face behind the eyes, in front of the ears much flattened, in front of the eyes prominent, convex, concealing the eyes when viewed anteriorly; lips smooth, without vertical wrinkles, sides of the lips very thick, the outer edge exceeding the inner in length, fringed with short fine hairs.

Gular sac large in male, rudimentary in female.

Wings from the lower end of the tibia.

Fur, above, reddish-brown; paler, almost buff, at the base of the hairs; beneath, much paler.

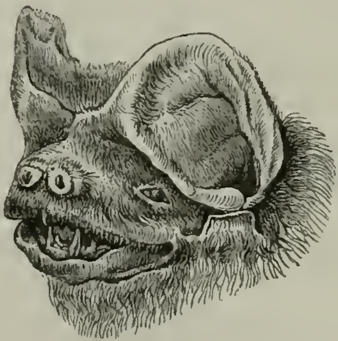
On the upper surface the wing-membrane is covered as far as a line drawn from the middle of the humerus to the knee; and a band of fur extends from the commencement of the middle third of the forearm along its posterior margin to the metacarpal bone of the fourth finger, covering one third of its length, and passing across it to the angle between it and the metacarpal of the third finger; beneath, the wing-membrane external to the humerus is naked.

First upper premolar minute, in the outer angle between the canine and second premolar, lower incisors crowded, bifid.

Length, head and body (about) 5″·0; tail 2″·8; ear 1″·5, tragus 0″·2 × 0″·1; forearm 2″·9; thumb 0″·45; second finger—metacarp. 3″·0, 1st ph. 1″·35, 2nd ph. 1″·6; third finger—metacarp. 2″·9, 1st ph. 1″·15, 2nd ph. 0″·25; fourth finger—metacarp. 1″·65, 1st ph. 0″·9, 2nd ph. 0″·35; foot and claws 0″·65.

Hab. Brazil (Lagoa Santa; Parahyba; Barra do Rio Negro); Bolivia.

Fig. 2.



Head of *M. glaucinus.*

8. Molossus glaucinus.

Dysopes glaucinus, Natt., Wagner, Wiegm. Archiv. 1843, p. 368; Suppl. Schreb. Säugeth. v. p. 710 (1855); Burmeister, Thiere Brasiliens, p. 73 (1854); Peters, Mon. Akad. Berl. 1866, p. 22.

Molossus ferox, Gundlach, Mon. Akad. Berl. 1861, p. 149; Peters, *l. c.* 1865, p. 574.

In the form of the muzzle and ears very similar to the preceding species; but the ears are comparatively much smaller; laid forwards, the inner margin of the ear-conch reaches to within one tenth of an inch from the extremity of the muzzle; inner margins of the ears united by their bases on the muzzle at a point nearer to the extremity of the nose than to the anterior commissure of the eyelids; outer and inner margins of the conch regularly convex; antitragus separated by a deep and narrow emargination, commencing anteriorly in a plane slightly above the angle of the mouth, tragus small, quadrate, superior margin straight, outer and inner margins concave, no projecting lobule at the base of the outer margin; keel of the ear-conch as in *M. perotis*, terminating posteriorly and inferiorly in a deep, thick, flattened ridge, which is in the same perpendicular line with, and almost touches the antitragus.

A smaller gular sac in ♂, rudimentary in ♀, opening directed downwards and slightly forwards.

Wings from the ankles; distribution of fur upon the wing-membranes as in *M. perotis*; above, light brown at the base of the hairs, then chestnut-brown, the extreme tips greyish, so that the upper surface appears altogether grey; beneath similarly coloured but much paler.

Upper and lower incisors as in *M. perotis*; the first upper premolar scarcely elevated above the gum, in the centre of the space between the canine and second premolar.

Length (of an adult ♀): head and body 3″·1; tail 2″·15, tail free from membrane 1″·0; head 1″·2; ear 0″·9, tragus 0″·12; forearm 2″·35; thumb 0″·35; second finger—metacarp. 2″·35, 1st ph. 1″·0, 2nd ph. 1″·2; third finger—metacarp. 2″·25, 1st ph. 0″·85, 2nd ph. 0″·3; fourth finger—metacarp. 1″·2, 1st ph. 0″·75, 2nd ph. 0″35; tibia 0″·8; foot and claws 0″·5.

Hab. Brazil (Mato Grosso); Surinam; Jamaica; Cuba.

9. MOLOSSUS BONARIENSIS.

Promops bonariensis, Peters, Mon. Akad. Berl. 1874, p. 232 (cum fig., pl.).

Ears united by a deeper band than in *M. glaucinus*; ear-conch as broad as high; antitragus broader than high, convex; tragus quadrate, as in the preceding species. Muzzle obliquely truncated, extremity of the nose almost double as broad as the base of the antitragus; upper lip with a few shallow vertical wrinkles.

Wing-membrane from the ankles.

Fur rather short, somewhat shorter above than beneath. Beneath, the wing-membrane is covered as far as a line drawn from the middle of the humerus to the knee; a few short hairs extend along the posterior margin of the forearm. Above, the outer half of the antebranchial membrane is covered with short woolly hairs; and a band of similar hairs passes outwards behind the forearm, becoming gradually so broad as to cover almost half the metacarpal bone of the last finger. Above, reddish brown, the base of the hairs whitish; paler beneath, the extremities of the hairs brownish white.

The skull agrees in size with that of *M. nasutus*, Spix; but the facial portion is much longer, and the brain-case wider than in that species. Upper incisor on each side with a short outer basal cusp, and separated from the canine by a slight interval; first upper small premolar in the space between the canine and second premolar.

Length: head and body 3″·0; tail 1″·4, tail free from membrane 0″·65; head 1″·0; ear 0″·6, tragus 0″·12; forearm 1″8; thumb 0″·34; second finger—metacarp, 1″·8, 1st ph. 0″·7, 2nd ph. 0″·65; third finger—metacarp. 1″·7, 1st ph. 0″·6, 2nd ph. 0″·2; fourth finger—metacarp. 0″·65, 1st ph. 0″·55, 2nd ph. 0″·15; tibia 0″·55; foot and claws 0″·44.

Hab. Buenos Ayres.

I have not seen the single specimen as yet obtained of this recently described species. I have therefore been obliged to copy Prof. Peters's original description, which is accompanied by an excellent plate.

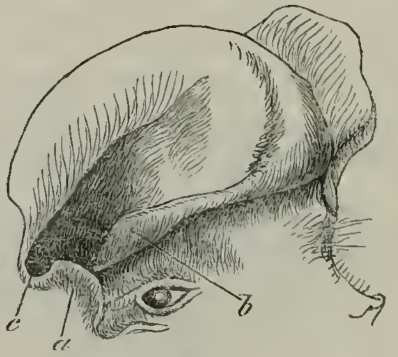
Genus NYCTINOMUS.

Nyctinomus, Geoffroy, Descript. de l'Egypte, ii. p. 114 (1812); Horsfield, Zool. Researches in Java; Gray, Mag. Zool. Bot. ii. (1838), p. 500; Peters, Mon. Akad. Berl. 1865, p. 573.

Dinops, Savi, Nuov. Giorn. de' Lett. p. 230 (1825); Bullet. des Scien. Nat. viii. p. 286 (1826).

Dysopes, Cretzschmar (non Illiger), Rüppell, Atlas Reise nördl. Afrika, Zoolog. (1826), p. 69; Temminck (in part), Monogr. Mammal. i. p. 226 (1835–41).

Fig. 3.



Head of *Nyctinomus macrotis*.

a. Antitragus; *b*. Keel of the ear-conch; *c*. Notch behind antitragus.

Ears united on the muzzle, or close together by the bases of their inner margins; tragus short, quadrate, or rounded off above, never linear; extremity of the muzzle broad, very obliquely truncated, projecting considerably beyond the lower lip, terminated by the sharply cut margin of the nostrils; upper lip very expansible, generally deeply grooved with vertical wrinkles; wings and feet as in *Molossus*.

Dentition.—Inc. $\frac{2}{6}$ or $\frac{2}{4}$, C. $\frac{1-1}{1-1}$, Pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, M. $\frac{3-3}{3-3}$.

Premaxillary bones separate in front or conjoined by cartilage only, upper incisors close to the canines by their bases, separate in front, their cusps converging inwards and forwards.

Range.—Generally distributed throughout the tropical and warmer parts of the temperate zones of both hemispheres.

In the following analytical table of the species, and in the subsequent descriptions, reference is often made to the different parts of the ear-conch which are shown and named in the drawing (see p. 716), which represents, in half-shading, the head of *Nyctinomus macrotis*, Gray.

Synopsis of the Species.

- I. Premolars $\frac{2-2}{2-2}$.
  - *a*. Integument of the ears thick, opaque; keel of the ear-conch thickened in lower third; antitragus separated by a deep notch.
    - *a'* Lips smooth; inner margins of the ears arising from the muzzle by distinct points of origin; tragus broad, rounded off above.
      - *α*. Antitragus irregularly quadrate; lower incisors 4 .... 1. *N. africanus*, p. 719.
    - *b'* Lips furrowed by deep vertical wrinkles.
      - *a''*. Ears separate or conjoined at the bases of their inner margins only; tragus broad, rounded off above.
        - *a'''*. Ears conjoined at the bases of their inner margins; gular sac distinct in ♂.
          - *β*. Antitragus obliquely triangular, rounded; lower incisors 6 ...... 2. *N. cestoni*, p. 719.
        - *b'''*. Ears separate; no gular sac.
          - *γ*. Antitragus half oval.
            - *α'*. Lower incisors 4 .... 3. *N. ægyptiacus*, p. 721.
            - *β'*. Lower incisors 6 .... 4. *N. tragatus*, p. 721.
      - *b''*. Ears conjoined by a more or less deep band; tragus small; no gular sac.
        - *c'''*. Ears conjoined at the bases of their inner margins.
          - *α*. Fur unicoloured; wings from the lower end of the tibiæ .... 5. *N. plicatus*, p. 721.
          - *β*. Fur greyish on the surface; wings from the middle of the tibiæ ... 6. *N. bivittatus*, p. 722.
        - *d'''*. Ears conjoined by a deep band in front.
          - *α*. The first upper premolar stands in the tooth-row.
            - *α'*. Lower third of the ear-keel much thickened and flattened externally.. .... 7. *N. brachypterus*, p. 722.
            - *β'*. Lower third of the ear-keel slightly thickened, not flattened externally.
              - *α''*. Fur of the chest and abdomen uniform in colour .... 8. *N. pumilus*, p. 723.
              - *β''*. Fur of the lower half of the chest and the abdomen white............... 9. *N. limbatus*, p. 724.

β. The first upper premolar external to the tooth-row.
γ′. Lower third of the ear-keel slightly thickened, not flattened externally.
γ″. Tragus quadrate ...... 10. *N. angolensis*, p. 724.
δ′. Lower third of the ear-keel much thickened and flattened externally.
δ″. Tragus narrow, much longer than broad, rounded off above .... 11. *N. miarensis*, p. 725.
ϵ″. Tragus quadrate ...... 12. *N. mops*, p. 726.
e‴. Ears conjoined by a very deep band anteriorly, and, posteriorly, by a second low band .... 13. *N. johorensis*, p. 726.
b. Integument of the ears thin, translucent; keel of the ear-conch slender, deep, bent backwards on itself.
a′. Antitragus separated by a deep notch; lower incisors 4.
a″. Muzzle thick, not concave in front of the eyes; upper lip with vertical wrinkles.
a‴. Ears separate; a large gular sac ... 14. *N. australis*, p. 728.
b‴. Ears united by a low band near the extremity of the muzzle; no gular sac .... 15. *N. megalotis*, p. 728.
b″. Muzzle concave between the eyes and extremity of the nose; upper lip furrowed by deep oblique wrinkles; ears united on the forehead slightly in front of the eyes; no gular sac.
c‴. Ears united by a deep band, antitragus much longer than high ... 16. *N. macrotis*, p. 729.
d‴. Ears united by a low band; antitragus as high as long .... 17. *N. gracilis*, p. 731.
b′. Antitragus separated by a very shallow notch; lower incisors 6.
c″. Muzzle flat in front of the ears; upper lips with vertical wrinkles.
e‴. Ears separate.
α. Tragus quadrate, broad above; first upper premolar in the centre of the space between the canine and second premolar ... 18. *N. brasiliensis*, p. 731.
β. Tragus triangular, narrow above; first upper premolar larger, filling up the space between the canine and second premolar ... 19. *N. norfolcensis*, p. 732.

II. Premolars $\frac{1-1}{2-2}$.
c′. Antitragus separated by a very shallow notch, lower incisors 6.
d″. Muzzle flat or rounded off above; upper lip with ill-defined vertical wrinkles.
f‴. Ears separate, tragus triangular, rounded off above.
α. Ear broad above, upper third of the inner margin straight ...... 20. *N. albiventer*, p. 733.
β. Ear narrow above, upper third of the inner margin deeply concave 21. *N. acetabulosus*, p. 734.

Inc. $\frac{2}{4}$ *or* $\frac{2}{6}$; *pm.* $\frac{2-2}{2-2}$; *ears united or close together.*
(Subgen. NYCTINOMUS, Peters.)

1. NYCTINOMUS AFRICANUS.

Nyctinomus africanus, Dobson, Ann. & Mag. Nat. Hist. ser. 4, vol. xviii. p. 348 (1876).

Ears large, their inner margins arising from perfectly distinct points of origin though close together, outer and inner margins of the ear-conch regularly convex, forming an arc of a circle; antitragus irregularly quadrilateral with a broad base, separated posteriorly by a moderately deep notch, upper margin straight or even slightly concave; tragus broad, evenly rounded off above; keel of the ear very prominent, thickened and flattened externally in lower third.

Fur bright orange-chestnut above and beneath. The fur of the body extends upon the wing-membrane above almost as far as a line drawn from the middle of the humerus to the knee, and upon the base of the interfemoral membrane; the remainder of the upper surface is naked. Beneath, the fur scarcely extends so far outwards upon the wing-membrane between the humerus and femur as upon the upper surface; but a narrow band of short hairs passes outwards behind the posterior margin of the forearm to the carpus.

Lower incisors 4, not crowded; first upper premolar very short and blunt, but occupying by its base the whole space between the canine and second premolar.

Length: head and body 3″·4; tail 2″·4, tail free from membrane 1″·5; head 1″·2; ear 1″·0, tragus 0″·3 × 0″·15; forearm 2″·5; thumb 0″·4; second finger—metatarp. 2″·4, 1st ph. 1″·1, 2nd ph. 1″·3; third finger—metacarp. 2″·15, 1st ph. 0″·9, 2nd ph. 0″·35; fourth finger—metacarp. 1″·25, 1st ph. 0″·75, 2nd ph. 0″·3; tibia 0″·75; foot and claws 0″·45.

Hab. South Africa (Transvaal Republic). Type in the collection of the British Museum.

2. NYCTINOMUS CESTONI.

Dinops cestonii, Savi, Nuov. Giorn. de' Letter. p. 230 (1825); Bullet. des Sci. Nat. viii. p. 286 (1826); Temminck, Monogr. Mammal. i. p. 262 (1835–41).

Dysopes rüppellii, Temm. *l. c.* ii. p. 224.

Dysopes midas, Sundevall, Stockh. Vet. Ak. Handl. 1842, p. 207.

Dysopes cestonii, Wagner, Suppl. Schreb. Säugeth. v. p. 702; var. *nigrogriseus*, Schneider, Nouv. Mém. Soc. Helvét. xxiv. 1871, p. 9.

Nyctinomus insignis, Blyth, Cat. Mamm. Mus. A. S. Beng. (1863).

Nyctinomus (*Dysopes*) *ventralis*, Heuglin, Nova Acta Acad. Leop.-Carol. 1861, p. 11*.

Dysopes (*Molossus*) *rueppelli*, Swinhoe, P. Z. S. 1870, p. 619.

Nyctinomus cestonii, Dobson, Mon. As. Chiropt. p. 180 (1876).

Ears united by the bases of their inner margins on the muzzle at a short distance from the extremity of the nose, their round superior and internal margins projecting slightly beyond the end of the muzzle (fig. 4); general form of the ear-conch and tragus as in preceding species; but the tragus is proportionally larger, and the antitragus is obliquely triangular and separated posteriorly by a deep notch. Upper lips very thick, with well-marked vertical wrinkles (fig. 4). Males with a small glandular gular sac, opening in the centre of the inferior surface of the neck, slightly in front of the anterior extremity of the sternum, by a circular orifice concealed by the fur.

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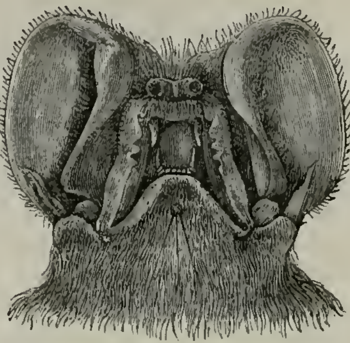
* The type of *N. ventralis* is preserved in the Stuttgart Museum, and, Dr. Krauss informs me, is identical with *N. cestoni*.

Fig. 4.



Head of *Nyctinomus cestoni*.

Wings from the distal third of the tibia.

Fur, above, reddish-brown with an orange tinge, the extreme tips of the hairs greyish; beneath, similar but paler. The wing-membrane on the upper surface is covered as far as a line drawn from the middle of the humerus to the knee, and the base of the interfemoral membrane; the antebrachial membrane is clothed with short fur; the forearm, legs, and remainder of the wings naked. Beneath, the fur extends outwards to a less distance, ending by an abrupt well-defined, straight margin; the antebrachial membrane is naked. The lower margin of the upper lip is fringed with fine hairs; the face is almost naked; a few short hairs form an arch on the inner side of the ear-conch; and the cutaneous band connecting the inner sides of the ears with the muzzle is clothed with erect hairs.

First upper premolar minute, acutely pointed, in the centre of the space between the canine and second large premolar; lower incisors 6, the central pair in front of next two, which touch the small incisors on each side next the canines, but do not overlap them.

Length (of an adult ♂): head and body 3″·4; tail 2″·0, tail free from membrane 1″·1; head 1″·3; ear 1″·2, tragus 0″·25 × 0″·20; forearm 2″·4; thumb 0″·35; second finger—metacarp. 2″·4, 1st ph. 0″·95, 2nd ph. 1″·25; third finger—metacarp. 2″·2, 1st ph. 0″·8, 2nd ph. 0″·5; fourth finger—metacarp. 1″·3, 1st ph. 0″·7, 2nd ph. 0″·3; tibia 0″·75; foot and claws 0″·4.

Hab. Europe (Switzerland, Italy, Sicily, Greece); Africa (Egypt, Nubia); Asia (Amoy, China).

3. Nyctinomus ægyptiacus.

Nyctinomus ægyptiacus, Geoffroy, Descr. de l'Egypte, ii. p. 128, pl. ii. (1812).

Dysopes geoffroyi, Temminck, Monogr. Mammal. i. p. 226 (1835–41); Wagner, Suppl. Schreb. Säugeth. i. p. 469 (1844).

Much smaller than *N. africanus*. Ears quite separate, but close together by the bases of their inner margins; outer and inner margins of the ear-conch evenly convex, forming almost an arc of a circle above; antitragus half-oval, separated by a deep notch posteriorly; tragus broad and rounded off above as in the preceding species. Lips with vertical wrinkles.

Wing-membrane from the lower part of the tibiæ, near the ankles.

Fur, deep smoke-brown above, paler beneath. Distribution of hair on the membranes as in *N. cestoni*, except on the antebrachial membrane, which is nearly naked.

Length (of the type, an adult ♂ specimen preserved in alcohol): head and body 2″·6; tail 1″·6, tail free from membrane 0″·9; head 0″·95; ear 0″·9, tragus 0″·23 × 0″·15; forearm 1″·95; thumb 0″·28; second finger—metacarp. 1″·9, 1st ph. 0″·75, 2nd ph. 0″·8; third finger—metacarp. 1″·8, 1st ph. 0″·6; 2nd ph. 0″·4; fourth finger—metacarp. 1″·15, 1st ph. 0″·55, 2nd ph. 0″·3; tibia 0″·5; foot and claws 0″·35.

Hab. Africa (Egypt). Type in the collection of the Paris Museum.

4. Nyctinomus tragatus.

Nyctinomus tragatus, Dobson, J. A. S. B. 1874, p. 143, Monograph Asiatic Chiroptera, p. 181 (1876).

This species resembles *N. ægyptiacus* very closely, but is larger, and has always six lower incisors. That this is not due to age (as the young have generally six lower incisors, even in species in which four is the normal number in the adult animal) is shown by the relative measurements of this species and *N. ægyptiacus*, and by the presence in every specimen (as yet examined) of this species of six lower incisors.

Length: head and body 2″·9; tail 1″·7, tail free from membrane 0″·85; ear 0″·9, tragus 0″·23 × 0″·15: forearm 2″·0; second finger 3″·6; fourth finger 1″·9; tibia 0″·6; foot and claws 0″·35.

Hab. Peninsula of India (Rajanpur, N.W. frontier; Jashpur near Chutia Nagpur; Calcutta).

Type in the collection of the Indian Museum, Calcutta.

5. Nyctinomus plicatus.

Vespertilio plicatus, Buchanan-Hamilton, Trans. Linn. Soc. v. p. 261, fig. (1800).

Nyctinomus bengalensis, Geoffr. Descr. de l'Egypte, ii. p. 130 (1812).

Nyctinomus tenuis et *N. dilatatus*, Horsfield, Zoolog. Researches in Java (1825); Cantor, J. A. S. B. xv. p. 179.

Dysopes murinus, Gray, Illustr. Ind. Zool. vol. i. pl. i. (1830.)

Dysopes plicatus, Temminck, Monogr. Mamm. i. p. 223 (1835–41).

Dysopes tenuis, Temminck, *l. c.* p. 228.

Nyctinomus plicatus, Jerdon, Mammals of India, p. 33 (1867); Dobson, J. A. S. B. 1874, p. 143; Monogr. Asiat. Chiropt. p. 182 (1876).

About the same size as *N. ægyptiacus*; but the ears are united by a low band in front, which forms an obtuse, slightly elevated, angular projection on the muzzle, and the tragus is very small, quadrate, the superior margin slightly concave, the outer margin with a small projection at the base; margin of the ear-conch evenly and broadly rounded off above; antitragus half oval, separated posteriorly by a deep notch. Upper lip very thick, deeply grooved by vertical wrinkles.

Wing-membrane from the lower end of the tibia.

Fur very dense and soft; above bluish-black or smoke-black, beneath somewhat paler.

First upper premolar small, in the space between the canine and second premolar.

Length (of an adult ♂): head and body 2″·9; tail 1″·7, tail free from membrane 1″·1; head 1″·0; ear 0″·9, tragus 0″·1 × 0″·03; forearm 1″·95; second finger 3″·9; fourth finger 1″·7; tibia 0″·7; foot and claws 0″·35.

Hab. Peninsula of India (Calcutta, Ludiana, Agra, Madras); Sumatra; Java; Borneo; Malay peninsula (Singapore); Philippine Islands.

6. Nyctinomus bivittatus.

Nyctinomus bivittatus, Heuglin, Nova Acta Ac. Leop.-Car. 1861, p. 13.

Ears conjoined by a low band, very slightly raised above the muzzle; tragus very small, quadrate; upper lip grooved by vertical wrinkles.

Base of the thumb with a remarkably large circular callous pad. Wings from the middle of the tibiæ.

Fur above umber-brown; the extremities of the hairs conspicuously tipped with grey, especially on the top of the head, where either side is streaked with grey, and on the shoulders and middle of the back spotted over with the same colour; beneath similar but paler. Distribution of the fur and dentition as in *N. plicatus*.

Length (of the type specimen, an adult ♂): head and body 2″·7; tail 1″·6; tail free from membrane 1″·15; head 1″·0; ear 0″·8; tragus 0″·1; forearm 1″·9; thumb 0″·35; second finger 3″·8; fourth finger 1″·8; tibia 0″·6; foot and claws 0″·4.

Hab. N.E. Africa (Bogos Land). Type in the collection of the Stuttgart Museum.

This species is very closely allied to *N. plicatus*, of which it may be considered the African representative.

7. Nyctinomus brachypterus.

Dysopes brachypterus, Peters, Reise nach Mossambique, Säugeth. p. 59 (1852).

Ears much shorter than the head, conjoined by a deep band on the muzzle as far forward as a point corresponding to the position of the upper incisors beneath; outer and inner margins continuous, evenly convex above, the inner margin with three minute horny points; antitragus well developed, separated by a deep notch, quadrangular with shortly rounded angles, the length of its base but slightly exceeding the depth of its anterior margin; tragus small, quadrate, its superior margin directed upwards and inwards, a small projection at the base of its outer margin; keel of the ear-conch large, thickened, expanded, and flattened externally in its lower third. Extremity of the nose projecting very much, the distance from the anterior margin of the nostril to the margin of the upper lip exceeding the diameter of the base of the antitragus; upper lip with vertical wrinkles.

Wings-membrane from the middle of the tibia.

Fur very short above and beneath; dark brown above, the base of the hairs whitish; beneath dirty yellowish-white, the sides of the body brown.

The first upper premolar stands in the tooth-row and fills up the narrow space between the canine and second premolar; lower incisors very small, not occupying all the space in front of the canines.

Length (of an adult ♀ specimen): head and body 2″·25; tail 1″·25, tail free from membrane 0″·8; head 0″·9; ear 0″·7, tragus 0″·1 × 0″·03; forearm 1″·35; thumb 0″·3; second finger—metacarp. 1″·35, 1st ph. 0″·55, 2nd ph. 0″·7; third finger—metacarp. 1″·3, 1st ph. 0″·45, 2nd ph. 0″·35; fourth finger—metacarp. 0″·8, 1st ph. 0″·35, 2nd ph. 0″·15; tibia 0″·45; foot and claws 0″·3.

Hab. Africa (Sierra Leone, Lagos, Mozambique). Type in the collection of the Berlin Museum.

8. NYCTINOMUS PUMILUS.

Dysopes pumilus, Cretzsch., Rüppell, Atlas, Reise nördl. Afrika, Zool. p. 69, pl. xxvii. (1826); Temminck, Monogr. Mamm. ii. p. 354 (1835–41); Wagner, Suppl. Schreb. Säugeth. i. p. 470 (1844).

Ears shorter than the head, united upon the muzzle as in the preceding species, but by a deeper band; outer and inner margins of the ear-conch continuous, evenly rounded above, the inner margin with three minute horny points; antitragus half-oval, arising abruptly from a point behind and on the same level with the angle of the mouth, directly below the posterior commissure of the eyelids, separated posteriorly by a narrow moderately deep notch; tragus small, quadrate, superior margin straight, parallel to the base of the tragus; keel of the ear-conch small, straight, not expanded in lower third. Extremity of the muzzle not projecting as much as in the preceding species, the distance from the anterior margin of the nostril to the margin of the upper lip not exceeding the length of the base of the antitragus; upper lip very expansible, with deep vertical wrinkles.

Wing-membrane from the distal third of the tibia.

Fur rather short, but longer than in the preceding species; above, whitish at the base, then dark brown to the tips of the hairs; beneath, less white at the base of the hairs, but slightly greyish at the tips.

Distribution of the fur upon the wing-membrane as in *N. cestoni*; a narrow band of short hairs behind the anterior two thirds of the forearm on the upper surface.

In ♂ a thick tuft of long hairs arises from the back of the deep band connecting the ears; in ♀ this hair is not longer than on the adjoining inner sides of the backs of the ears.

Lower incisors very small, crowded; first upper premolar minute, with an acute cusp, in the centre of the space between the canine and second premolar.

Length (of an adult ♂): head and body 2″·1; tail 1″·25, tail free from membrane 0″·75; head 0″·8; ear 0″·65, tragus 0″· × 1 0″·03; forearm 1″·5; thumb 0″·7; second finger—metacarp. 1″·4, 1st ph. 0″·6, 2nd ph. 0″·7; third finger—metacarp. 1″·35, 1st ph. 0″·5, 2nd ph. 0″·4; fourth finger—metacarp. 0″·85, 1st ph. 0″·4, 2nd ph. 0″·2; tibia 0″·5; foot and claws 0″·25.

Hab. Africa (Abyssinia, Nubia, Egypt).

9. Nyctinomus limbatus.

Dysopes limbatus, Peters, Reise nach Mossambique, Säugeth. i. p. 56 (1852).

Nyctinomus leucogaster, Grandidier, Rev. et Mag. Zool. 1869, p. 337.

This form can be distinguished from *N. pumilus* only by the different colour of the fur of the ventral surface and of the wing-membranes, and by the slightly broader tragus. In every other respect it agrees so perfectly in structure and measurements with that species, that I can scarcely consider it specifically distinct.

Fur above dark brown, also the shoulders, throat, and upper part of the breast; the remaining parts of the ventral surface pale yellowish white, and the wing, antebrachial, and inferior surface of the interfemoral membrane of the same colour. In immature individuals the white colour of the ventral surface is not so much extended, but appears as a more or less broad patch on the abdomen, increasing in extent according to age.

Hab. Africa, south of the Equator (Zanzibar, Mozambique, Angola); Madagascar.

This appears to be the southern representative of *N. pumilus*.

10. Nyctinomus angolensis.

Nyctinomus angolensis, Peters, Jorn. Scien. Mathem. Phys. e Natur. Lisboa, vol. iii. p. 124 (1870).

Ears much shorter and more triangular than in any of the species previously described, conjoined on the muzzle by a very deep band, as in *N. pumilus*; the antitragus and keel of the ear-conch as in that species; integument of the ears thick; tragus very small, quadrate, superior margin directed upwards and outwards. Upper lip remarkably thick in front, so that the extremity of the nose does not project much beyond its margin, its sides grooved by vertical furrows.

Thumb long; feet large; wing-membrane from the middle of the tibiæ.

Fur above and beneath very short; above white at the base, terminal three fourths of the hairs deep reddish-brown; beneath, yellowish-white or pale reddish-yellow; the shoulders, sides of the neck, chest, and abdomen reddish brown. On the upper surface the membranes are almost quite naked; beneath, the wing-membrane is covered with very short fine pale yellowish-white hairs as far outwards as a line drawn from the middle of the humerus to the knee; and similar short fur appears upon the interfemoral membrane.

First upper premolar very small, scarcely visible without the aid of a lens, in the outer angle between the closely approximated canine and second premolar; sometimes deciduous. Lower incisors crowded. Length (of an adult ♀): head and body 2″·9; tail 1″·8, tail free from membrane 0″·95; head 1″·05; ear 0″·75, tragus 0″·1 × 0″·03; forearm 1″85; thumb 0″·45; second finger—metacarp. 1″·85, 1st ph. 0″·85, 2nd ph. 1″·25; third finger—metacarp. 1″·8, 1st ph. 0″·7, 2nd ph. 0″·65; fourth finger—metacarp. 1″·2, 1st ph. 0″·55, 2nd ph. 0″·22; tibia 0″·65; foot and claws 0″·4.

Hab. Africa (Angola, Coanza river); Madagascar (Mahanora).

Nyctinomus hepaticus, Heuglin (Nov. Act. Acad. Leop.-Car. xxiii. 1864, p. 14), appears from the original description to be very closely allied to, if not identical with, *N. angolensis*. But Dr. Krauss informs me that the type is not in the Royal Zoological Museum at Stuttgart, where the types of the other species of Bats described by Herr von Heuglin are preserved; and he doubts whether any specimen of the species was brought by the describer to Europe. As the description is very imperfect, and as the type cannot be found, this species must remain doubtful.

11. Nyctinomus miarensis.

Nyctinomus miarensis, Grandidier, Rev. et Mag. Zool. 1869, p. 337.

Nyctinomus unicolor, Grandidier, *l. c.* 1870, p. 49.

About the same size as *N. cestoni*. Ears shorter than the head, united on the muzzle by a band about 0″·15 high in the centre, at a distance of 0″·2 behind the extremity of the nose; ear-conch broadly rounded off above, the outer and inner margin continuous; antitragus longer than high, irregularly quadrate, the shortest side above, separated by a deep notch posteriorly; tragus narrow, much longer than broad, shortly rounded off above, inner margin slightly concave, outer straight, in general shape altogether different from that of any of the previously described species; keel of the ear-conch well developed, prominent, thickened and expanded in lower third, upper lip very expansible, deeply grooved by vertical furrows.

Thumb short, with a large circular callosity. Wings from the lower end of the tibiæ. Fur above dark brown, beneath brown with slightly ashy extremities.

Lower incisors 4, the middle incisors overlapping the outer ones;

first small upper premolar crushed in between the canine and second premolar, and rather to the outer side.

Length (of an adult ♀ specimen, the type): head and body 3″·5; tail 1″·65, tail free from membrane 1″·0; head 1″·3; ear 1″·0, tragus 0″·15 × 0″·4; forearm 2″·4; thumb 0″·35; second finger—metacarp. 2″·4, 1st ph. 0″·5, 2nd ph. 1″·4; third finger—metacarp. 2″·25, 1st ph. 0″·85, 2nd ph. 0″·6; fourth finger—metacarp. 1″·35, 1st ph. 0″·75, 2nd ph. 0″·3; tibia 0″·7; foot and claws 0″·5.

Hab. Madagascar. Type in the Paris Museum.

12. NYCTINOMUS MOPS.

Dysopes mops, F. Cuvier, Dents des Mammif. p. 49 (1825).

Mops indicus, Lesson, Table du Règne Anim. Mamm. p. 18 (1842); Peters, Monatsb. Akad. Berl. 1869, p. 402.

Nyctinomus mops, Dobson, Monogr. Asiatic Chiroptera, p. 182 (1876).

Ears larger than in *N. angolensis*; upper three fourths of the margin of the ear-conch regularly convex, forming almost an arc of a circle; inner margins conjoined by a deep band 0″·2 high in the centre; tragus very small, quadrate; antitragus large, quadrilateral with rounded angles, nearly as high as long, separated posteriorly by a deep notch, ending abruptly anteriorly, close to the angle of the mouth. Upper lip with deep vertical wrinkles.

Thumb rather long, armed with a well-developed claw; wings from the lower third of the tibia.

Fur very short above and beneath; on the dorsal surface dark brown, somewhat paler beneath, extending upon the wing-membrane along the sides of the body only.

Upper incisors short, separated by a small interval in front; lower incisors 4, crowded; first upper premolar very small, deciduous, in the outer angle between the closely approximated canine and second premolar.

Length (of the type specimen): head and body 3″·0; tail 1″·5, tail free from membrane 0″·95; ear 0″·95, tragus 0″·1; forearm 1″·8; thumb 0″·4; second finger 3″·5; fourth finger 1″·8; tibia 0″·7; foot and claws 0″·45.

Hab. Sumatra.

This species is closely allied to *N. angolensis*, agreeing with it in the position of the minute first upper premolar (which is quite external to the tooth-row), in the remarkable length of the thumb as compared with other species of this genus (except *N. johorensis*), and in the peculiar shortness of the fur. It is, however, readily distinguished by the form and size of the ears, and by other characters described above.

13. NYCTINOMUS JOHORENSIS.

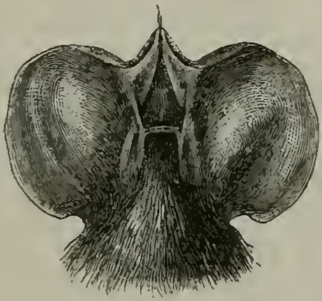
Molossus (*Nyctinomus*) *johorensis*, Dobson, Proc. Asiat. Soc. Beng. 1873, p. 22.

Nyctinomus (*Chærephon*) *johorensis*, Dobson, Journ. Asiat. Soc. Beng. 1874, p. 144.

Nyctinomus johorensis, Dobson, Monogr. Asiat. Chiroptera, p. 183 (1876).

Ears as in *N. plicatus*; but their inner margins are connected by a band of integument which extends forwards on the muzzle as far as a point placed midway between a line joining the eyes and the extremity of the muzzle; this connecting band is continued upwards and backwards between the ears to a height of 0″·4 inch, forming an incomplete funnel open behind, wide below, and narrow above. At a distance of about 0″·3 inch from the anterior connecting band, the ears are again connected by a second fold of integument, posterior and parallel to the first, about 0″·1 inch in vertical height (fig. 5). Between these two connecting folds of integument and the sides of the ear a hollow square is contained. This concavity is empty, and open only from above. At the base of the funnel-shaped anterior boundary a few long hairs exist, as in *N. pumilus*. Margin of the ear-conch evenly convex above; antitragus large, separated by a deep notch; tragus very small, quadrate, superior margin slightly concave.

Fig. 5.



Head of *N. johorensis*.

The animals of this genus possess the power of folding the ear-conch forwards, downwards, and outwards, thus closing the external ear. When the ears are closed, the superior part of the funnel-shaped connecting band is, in this species, drawn forwards, disclosing the cavity behind. In the erect condition of the ears the same funnel-shaped process is drawn backwards across this square hollow cavity, which it covers, as the pitcher of *Nepenthes* is covered by the leaf forming its lid. In this position the extremity of the funnel is flattened out, and lies in the space contained between the posterior connecting band and the top of the head.

The thumb is comparatively longer than in any other species of the genus, and the wing-membrane is attached a short distance below the knee-joint.

Upper incisors separated by a very narrow interval in front; lower incisors 4.

Length: head and body 2″·8; tail 1″·7, tail free from membrane 1″·0; ear 0″·9, tragus 0″·1; forearm 1″·9; thumb 0″·5: second finger 3″·6; fourth finger 1″·8; tibia 0″·7; foot and claws 0″·4.

Hab. Malay peninsula (Johore).

Type in the collection of the Indian Museum, Calcutta.

14. NYCTINOMUS AUSTRALIS.

Molossus australis, Gray, Mag. Zool. Bot. ii. p. 501 (1838).

Ears large, but shorter than the head, their inner margins arising close together on the muzzle from distinct points of origin, as in *N. africanus*; integument forming the ear-conch rather thin; keel very deep in lower third, but short and exceedingly thin, bent upwards and backwards; margin of the conch straight or slightly concave in superior third; antitragus very large, as high as long, posterior margin straight, anterior slightly convex, narrowly rounded off above; tragus short and broad as in *N. ægyptiacus*; but its outer margin is distinctly concave about the middle, and there is an obtuse projection at its base. Upper lip with short vertical wrinkles. The mouth of a very large gular sac, larger than in any other known species of this genus, extends across the throat from a point on each side near the anterior termination of the antitragus, opening forwards as in *Taphozous*.

Wings from the distal third of the tibia. Fur moderately long; above dark reddish-brown, beneath paler; the base of the hairs on both surfaces much lighter. On the dorsal surface the wings are covered as far as a line drawn from the middle of the humerus to the distal third of the femur, also the base of the interfemoral as far as a line drawn between the knees; ~~beneath~~, a narrow band of fur extends outwards behind the forearm, becoming wider in the angle between the forearm and the fifth metacarpal bone, along which it extends for half its length, and, passing over, covers the space between it and the upper third of the fourth metacarpal.

Upper incisors rather long, separated by a narrow space in the middle; lower incisors 4, bifid: first upper premolar minute, in the space between the canine and second premolar, drawn slightly inwards.

Length (of an adult ♂ specimen, the type): head and body 3″·0; tail 1″·9, tail free from membrane 1″·0; head 1″·15; ear 0″·9, tragus 0″·2 × 0″·15; forearm 2″·35; thumb 0″·35; second finger—metacarp. 2″·25, 1st ph. 0″·9, 2nd ph. 1″·2; third finger—metacarp. 2″·1, 1st ph. 0″·7, 2nd ph. 0″·55; fourth finger—metacarp. 1″·2. 1st ph. 0″·7, 2nd ph. 0″·25; tibia 0″·75; foot and claws 0″·5.

Hab. Australia; New Guinea.

Type in the collection of the British Museum.

15. NYCTINOMUS MEGALOTIS, n. sp.

Ears nearly as long as the head, projecting when laid forwards nearly one fifth of an inch beyond the muzzle; inner margins united on the muzzle by a low band at a distance from the end of the nose equal to the length of the base of the antitragus; inner and outer margins of the ear-conch evenly convex above; ear-keel very deep and slender in lower third, where it is partly folded upwards and backwards, so as to present a flat surface externally; superior and inner margin of the conch with four minute horny projections; antitragus rather small, but separated posteriorly by a deep notch, convex, about once and a half as long as high; tragus quadrate, with a straight superior margin and projecting outer angle, inner margin straight, outer slightly concave. Extremity of the muzzle very obliquely truncate. Upper lip very expansible, with a few deep vertical grooves. No gular sac. Thumbs and feet small. Wings from the lower end of the tibiæ.

Fur dark brown above and beneath, with slightly greyish extremities; the base of the hairs whitish. The face is nearly naked; a few hairs form a fringe along the anterior margin of the upper lip beneath the nostrils. With the exception of a narrow band of very short fine hairs, which extends on the upper surface of the wing-membrane behind the forearm to the carpus, the membranes external to the humerus appear to be quite naked; along the sides of the body the fur extends as far outwards, above and beneath, as a line drawn from the middle of the humerus to the knee.

Upper incisors separated by a space in front; lower incisors 4, bifid, crowded; internal basal cusp of canine small; first upper premolar small, conical, acutely pointed, in the centre of the rather wide space between the canine and second premolar; second upper premolar with an acute internal basal cusp; first lower premolar not crowded, as broad at the base as the second, which exceeds it (as in all other species of the genus) in vertical extent.

Length (of an adult ♂): head and body 3″·0; tail 2″·1, tail free from membrane 1″·1; head 1″·15; ear 1″·0, tragus 0″·15 × 0″·1; forearm 2″·35; thumb 0″·35; second finger—metacarp. 2″·25, 1st ph. 0″·95, 2nd ph. 1″·1; third finger—metacarp. 2″·1, 1st ph. 0″·8, 2nd ph. 0″·1; fourth finger—metacarp. 1″·1, 1st ph. 0″·75, 2nd ph. 0″·2.

Hab. Surinam. Type in the collection of the British Museum.

16. NYCTINOMUS MACROTIS.

Nyctinomus macrotis, Gray, Ann. & Mag. Nat. Hist. 1839, p. 5; Gervais, Expéd. Castelnau, Zoologie, p. 62, pl. xii. figs. 1 and 1 *a* (skull and teeth).

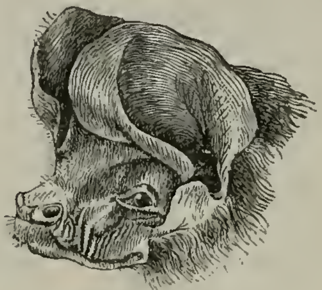
Dysopes auritus, Natt., Wagner, Wiegm. Archiv, 1843, p. 368; Burmeister, Thiere Brasiliens, p. 69 (1854).

Dysopes laticaudatus et *D. cæcus*, Rengger, Säug. Paraguay, p. 88.

? *Dysopes aurispinosus*, Peale, United-States Explor. Exped. viii. p. 21.

Ears large, nearly as long as the head, conjoined to a height of 0″·2 inch, the inner margins very convex and consequently close together for more than half their length above the band uniting their bases; integument forming the ear-conch very thin, translucent; keel very deep, projecting outwards beyond the antitragus, but also very slender, curved backwards and upwards; tragus small, quadrate, superior margin straight or very slightly concave, upper half of outer margin concave, lower half forming a prominent angular projection; antitragus considerably longer than high, terminating in front between the eye and the angle of the mouth (fig. 6), separated posteriorly by a deep notch. Face deeply grooved horizontally beneath the eye, which is remarkably prominent and directed forwards. Muzzle slender, concave between the ears and the projecting, sharply cut superior margin of the nostrils; nasal apertures directed almost laterally, separated by a wide space, which is divided in the middle by a raised vertical ridge. Upper lip deeply furrowed by oblique wrinkles. No gular sac. Thumb rather short, with a small callosity; terminal phalanx of third finger very short. Wings from the distal third of the tibiæ.

Fig. 6.



Head of *N. macrotis.*

Fur short, reddish brown above and beneath; on the upper surface extending upon the wing-membrane as far outwards as a line drawn from the middle of the humerus to the knee-joint, on the base of the interfemoral, and outwards behind the forearm in a narrow band to the carpus.

Teeth slender, with very acute cusps. Lower incisors 4, crowded, bifid. First upper premolar small, but acutely pointed, in the centre of the space between the canine and the second premolar; second premolar large, with a long and very acute internal basal cusp.

Length (of the type specimen, an adult ♀): head and body 2″·8; tail 1″·9, tail free from membrane 1″·0; head 1″·1; ear 1″·0, tragus 0″·15 × 0″·1; forearm 2″·2; thumb 0″·3; second finger—metacarp. 2″·1, 1st ph. 0″·9, 2nd ph. 1″·0; third finger—metacarp. 2″·0, 1st ph. 0″·75, 2nd ph. 0″·1; fourth finger—metacarp. 1″·0, 1st ph. 0″·7, 2nd ph. 0″·3; tibia 0″·65; foot and claws 0″·4.

Hab. Cuba; Brazil (Mato Grosso); Paraguay.

The next species, *N. gracilis,* resembles *N. macrotis* very closely in general structure, and forms with it a separate section of the genus, distinguished by the peculiar shape of the muzzle.

17. Nyctinomus gracilis.

Dysopes gracilis, Natt., Wagner, Wiegm. Archiv, 1843, p. 368; Suppl. Schreb. Säugeth. v. p. 708 (1855).

Nyctinomus gracilis, Peters, Monatsb. Akad. Berl. 1865, p. 573.

Ears conjoined by the bases of their inner margins only; general form of the ear-conch quite similar to that of *N. macrotis*; but the antitragus is higher than long, separated posteriorly by a very deep notch, and terminating abruptly in front near the angle of the mouth; tragus very small, quadrate, outer margin concave. Muzzle and remaining parts of the body as in *N. macrotis*. No gular sac. Fur short, dark brown above and beneath, extending upon the wing-membranes along the sides of the body only.

Length (of an adult ♂ specimen): head and body 2″·5; tail 1″·5, tail free from membrane 0″·7; head 0″·9; ear 0″·75, tragus 0″·1 × 0″·08; forearm 1″·8; thumb 0″·3; second finger—metacarp. 1″·7, 1st ph. 0″·75, 2nd ph. 0″·9; third finger—metacarp. 1″·65, 1st ph. 0″·65, 2nd ph. 0″·1; fourth finger—metacarp. 1″·0, 1st ph. 0″·5, 2nd ph. 0″·15; tibia 0″5; foot and claws 0″·35.

Hab. Brazil (Mato Grosso); Guatemala.

Although much smaller and with comparatively shorter ears, this species resembles *N. macrotis* so closely in its general structure that, at first sight, it appears to be a small variety of that species. On closer examination, however, it is easily distinguished by the very different form of the antitragus, and by the short connexion of the ears in front.

18. Nyctinomus brasiliensis.

Nyctinomus brasiliensis, Is. Geoffroy, Ann. des Sci. Nat. i. p. 337 (1824); Gervais, Expédit. de Castlenau, Zoologie, p. 60, pl. xii. figs. 2 and 2 *a* (teeth), 1855; Peters, Monatsb. Akad. Berl. 1865, p. 573.

Nycticejus cynocephala, Le Conte, Cuv. Anim. Kingd. (McMurtrie ed.) (1831), p. 431.

Dysopes nasutus, Temminck, Monogr. Mamm. i. p. 234 (1835).

Nyctinomus multispinosus (Peale), Burmeister (*vide* Peters, *l. c.* 1865, p. 573).

Molossus cynocephalus et *fuliginosus*, Cooper, Ann. New-York Lyc. iv. 1837, pp. 65, 67.

Rhinopoma carolinense, Gundlach, *nec* Geoffroy, Wiegm. Archiv, 1840, p. 358.

Dysopes naso, Wagner, Supp. Schreb. Säugeth. i. p. 475 (1844); v. p. 707 (1855).

Nyctinomus mexicanus, Saussure, Rev. et Mag. Zool. 1860, p. 283.

Molossus aztecus, Saussure, *l. c.* p. 285*.

Nyctinomus musculus, Gundlach, Monatsb. Akad. Berl. 1861, p. 149.

Nyctinomus nasutus, Tomes, P. Z. S. 1861, p. 68; Allen, Monograph of the Bats of North America, p. 7 (1864).

Ears nearly as long as the head, laid forward they extend almost to the end of the nose; inner margins not united, but arising close together from the muzzle about midway between a line drawn between the eyes and the extremity of the nose; inner and outer margins of the ear-conch almost regularly convex, continuous; the inner margin with five or six minute horny projections; antitragus but slightly developed, separated posteriorly by a shallow and small notch; tragus quadrate, larger than in *N. gracilis*. Upper lip with numerous vertical wrinkles; muzzle in front of the origin of the inner margins of the ears flat, terminated by the sharply cut margins of the nostrils. No gular sac.

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* Prof. Peters informs me that *Molossus aztecus*, Saussure, included by him in his subgenus *Molossops* (=*Myopterus*), is really a synonym of *N. brasiliensis*, as he has since ascertained by direct examination of the type.

Wings from the distal third of the tibiæ near the ankles. Fur moderately long and very dense, extending upon the wings above and beneath as far outwards as a line drawn from the middle of the humerus to the knee, the remainder naked. Lower incisors six, crowded; the outer incisors very slender, overlapping the external margin of the middle incisors, the internal margins of which are also overlapped by the central incisors; first upper premolar small, with an acute cusp well elevated above the gum in the centre of the small space between the canine and second premolar.

Length (of an adult ♀): head and body 2″·25; tail 1″·4, tail free from membrane 0″·8; head 0″·8; ear 0″·7, tragus 0″·15 × 0″·12; forearm 1″·7; thumb 0″·3; second finger—metacarp. 1″·65, 1st ph. 0″·65, 2nd ph. 0″·8; third finger—metacarp. 0″·65, 1st ph. 0″·55, 2nd ph. 0″·45; fourth finger—metacarp. 0″·8; 1st ph. 0″·5, 2nd ph. 0″·25; tibia 0″·5; foot and claws 0″·33.

Hab. The warmer regions of North and South America and their islands, extending from California to Chili; apparently everywhere distributed throughout the tropical and subtropical parts of America, where it is probably the most common species of the genus, as it has the widest range.

19. Nyctinomus norfolcensis.

Molossus norfolcensis, Gray, Ann. Nat. Hist. iv. p. 7 (1839).
Nyctinomus planiceps, Peters, Monatsb. Akad. Berl. 1866, p. 22.
Molossus wilcoxii, Krefft, List of Australian Bats (1871).

Ears triangular, shorter than the head, separate, their inner margins arising from distinct points of origin; inner margin of the conch almost straight, tip broadly rounded off, outer margin straight; antitragus scarcely distinguishable from the outer margin, a small almost imperceptible shallow notch indicating its commencement; tragus triangular, rounded off above. Muzzle flat, obtuse; the upper lip with shallow vertical wrinkles; nostrils opening sublaterally. Gular sac small, aperture circular, directed downwards; quite rudimentary in female. Wings from the ankles; the outer and inner toes equally enlarged.

Fur reddish brown above, paler beneath; base of the hairs much lighter. Above, a broad band of very short fur covers the wings behind the proximal four fifths of the forearm, but does not extend to the carpus.

Upper incisors long, widely separated at their bases, converging inwards and forwards; a blunt projection from the cingulum of each posteriorly. First upper premolar small, but much larger than in the other species of the genus, filling up the space between the canine and second premolar. Lower incisors six, deeply bifid; first lower premolar small and acutely pointed, its inner side partly covered by the expanded cingulum of the second premolar, as in *M. rufus*; second premolar double the size of the first, its cingulum directed obliquely forwards and upwards.

Length (of an adult ♀): head and body 2″·1; tail 1″·25, tail free from membrane 0″·6; head 0″·8; ear 0″·6, tragus 0″·15 × 0″·1; forearm 1″·35; thumb 0″·26; second finger—metacarp. 1″·3, 1st ph. 0″·55, 2nd ph. 0″·7; third finger—metacarp. 1″·25, 1st ph. 0″·45, 2nd ph. 0″·4; fourth finger—metacarp. 0″·9, 1st ph. 0″·35, 2nd ph. 0″·15; tibia 0″·4; foot and claws 0″·3.

Hab. Australia (New South Wales, Queensland); Norfolk Island.

Inc. $\frac{2}{6}$; *Pm.* $\frac{1-1}{2-2}$. *Ears separate, tragus triangular.*

(Subgen. MORMOPTERUS, Peters.)

20. NYCTINOMUS ALBIVENTER, n. sp.

Ears triangular, shorter than the head, inner margins arising from distinct points of origin from the forehead; inner margin of the ear-conch almost straight, slightly concave in upper third, tip rounded off, outer margin straight; antitragus scarcely defined, separated posteriorly by a very shallow notch; tragus nearly as broad opposite the base of its inner margin as high, irregularly triangular, rounded off above, very similar in shape to that of *N. norfolcensis*, but less triangular and broader above, an obtuse projection about the middle of its outer margin. Extremity of the muzzle projecting very much beyond the mandible, the end of the nose very prominent and distinct from the upper lip, nostrils opening almost laterally. Sides of the upper lip with vertical grooves not well defined. Gular sac small.

Wings from the lower third of the tibiæ or from the ankles; fifth toe somewhat smaller than the first.

Dentition similar to that of *N. acetabulosus* (to be described), but the lower incisors are not crowded.

Fur, above, white at the base, the remaining part dark brown; beneath, the greater part of the chest and abdomen dirty white, the sides brown. Wing- and interfemoral membrane nearly naked; a narrow band of fur extends outwards behind the forearm and along the proximal third of the fifth metacarpal bone.

Length (of an adult ♀, the type): head and body 2″·2; tail 1″·25, tail free from membrane 0″·7; head 0″·85; ear 0″·65, tragus 0″·15; forearm 1″·45; thumb 0″·35; second finger—metacarp. 1″·4, 1st ph. 0″·55, 2nd ph. 0″·7; third finger—metacarp. 1″·4, 1st ph. 0″·5, 2nd ph. 0″·35; fourth finger—metacarp. 0″·9, 1st ph. 0″·35, 2nd ph. 0″·15; tibia 0″·4; foot and claws 0″·3.

Hab. Madagascar.

Type in the British Museum.

21. NYCTINOMUS ACETABULOSUS.

Molossus acetabulosus, Commerson, MS. *Vide* Peters, Monatsb. Akad. Berl. 1869, p. 402.
Nyctinomus acetabulosus, Desmarest, Mammalogie, p. 117 (1820).
Nyctinomus natalensis, Smith, Zoolog. S. Africa, pl. 49.
Nyctinomus (*Mormopterus*) *jugularis*, Peters, P. Z. S. 1865, p. 468.

Ears quite separate, arising from the sides of the forehead at a short distance above and in front of the eye; the inner margin of the ear-conch slightly convex for two thirds its length, abruptly *concave* in upper third, so that the upper extremity of the ear is attenuated, and the subacute tip projects forwards and inwards, instead of backwards and outwards, as in most species of Bats; outer margin of the conch forming almost a straight line from the tip to its termination near the angle of the mouth, interrupted only by a slight emargination opposite the middle of the tragus, indicating the commencement of the antitragus; tragus nearly as broad as high, irregularly triangular, with a truncated vertical angle. Muzzle flat, extremity projecting considerably beyond the lower lip; sides of the upper lip with short ill-defined vertical wrinkles. In the male a large glandular sac in the centre of the inferior surface of the neck, in the female rudimentary.

Wings from the distal third of the tibiæ; the fifth toe not so much thickened as the first.

Fur dark reddish brown above, somewhat paler beneath. Upper incisors separate from the canines and also from each other; lower incisors small, slender, bifid, crowded; the second incisor on each side slightly overlapped by the margins of the first and third; canines without basal cusps; the single upper premolar separated by a narrow interval from the canine, with a projecting base internally, which is concave behind and anteriorly develops an acute cusp; first lower premolar unicuspidate, equal to three fourths the second in vertical extent.

Length (of an adult ♂): head and body 1″·9; tail 1″·7, tail free from membrane 0″·6; head 0″·75; ear 0″·6, tragus 0″·15; forearm 1″·55; thumb 0″·25; second finger—metacarp. 1″·5, 1st ph. 0″·6, 2nd ph. 0″·7; third finger—metacarp. 1″·5, 1st ph. 0″·5, 2nd ph. 0″·4; fourth finger—metacarp. 1″·15, 1st ph. 0″·4, 2nd ph. 0″·2; tibia 0″·4; foot and claws 0″·35.

Hab. S.E. Africa (Natal); Madagascar; Bourbon; Mauritius.

The three last-described species, *N. norfolcensis*, *N. albiventer*, and *N. acetabulosus*, differ from all the other species of the genus in the relative lengths of the metacarpal bones of the second and fourth fingers, resembling rather, in this respect, the species of the subgenus *Myopterus* (gen. *Molossus*). In all other species of *Nyctinomus* the metacarpal bone of the second finger is double the length of that of the fourth; in these three species, and in *Myopterus*, it is but one half longer. These species also agree together in the form of the tragus (in which they also differ from all other

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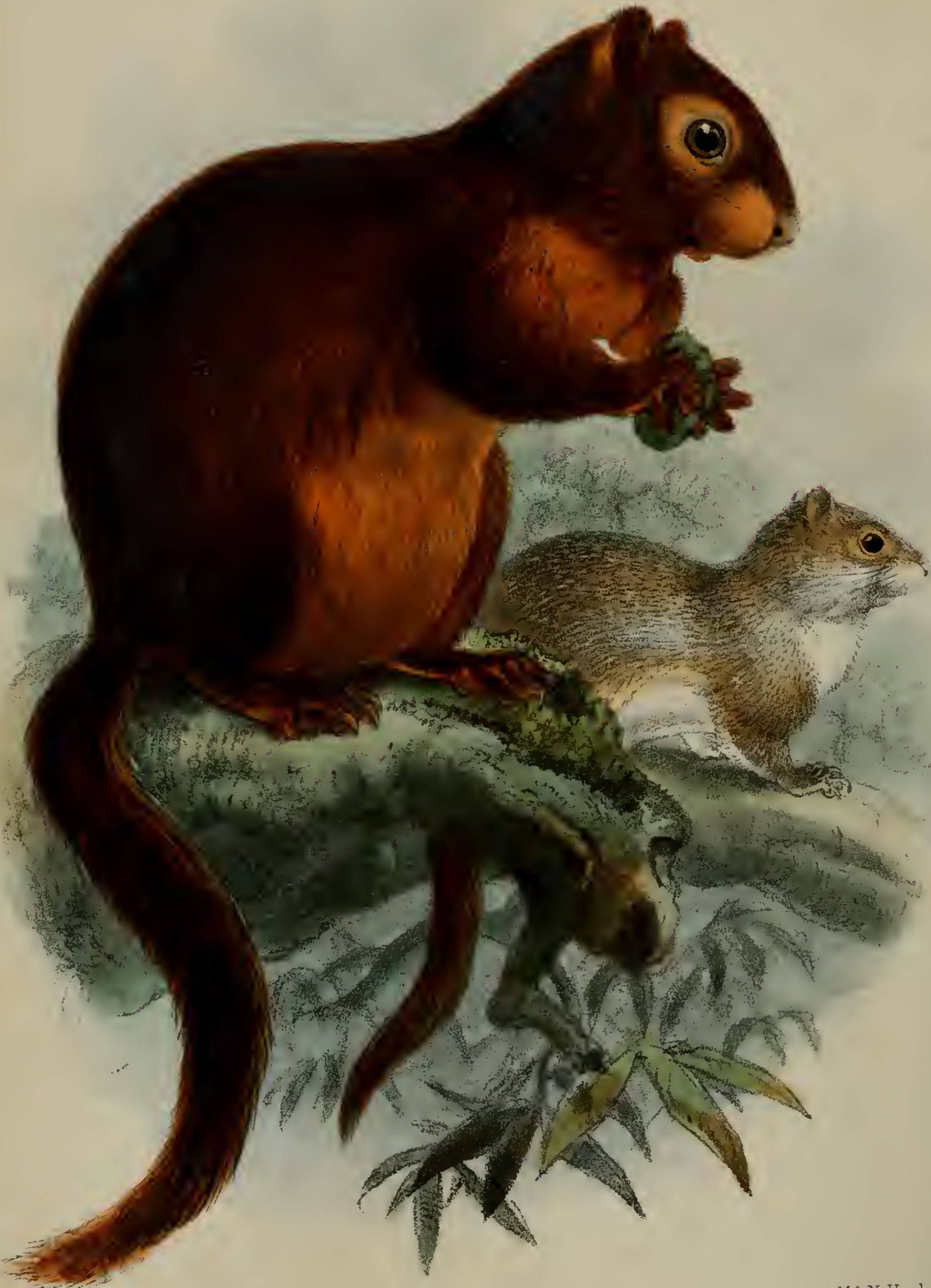

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SCIURUS STEERII

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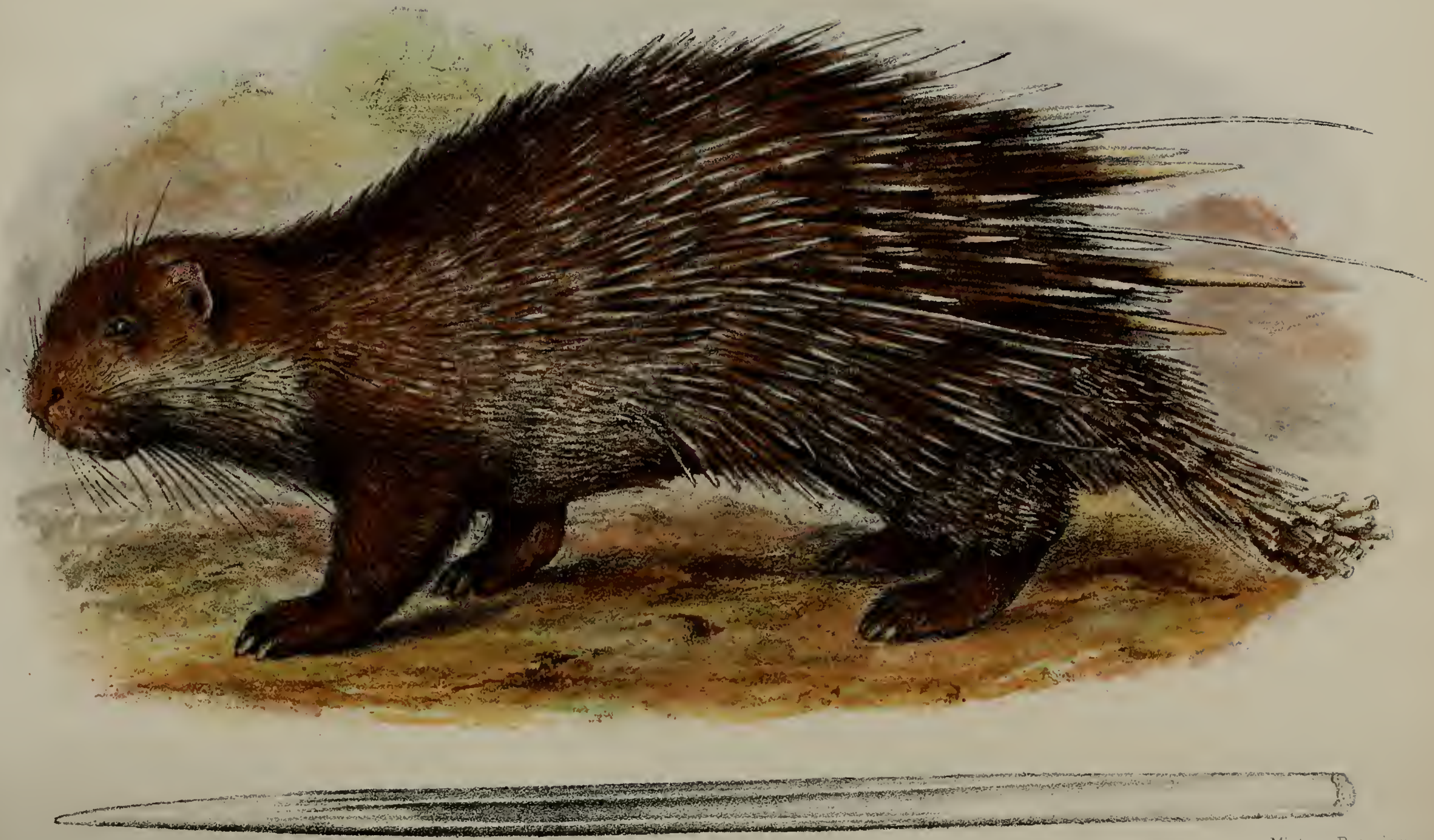

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Mintern Bros. imp.

HYSTRIX CRASSISPINIS.

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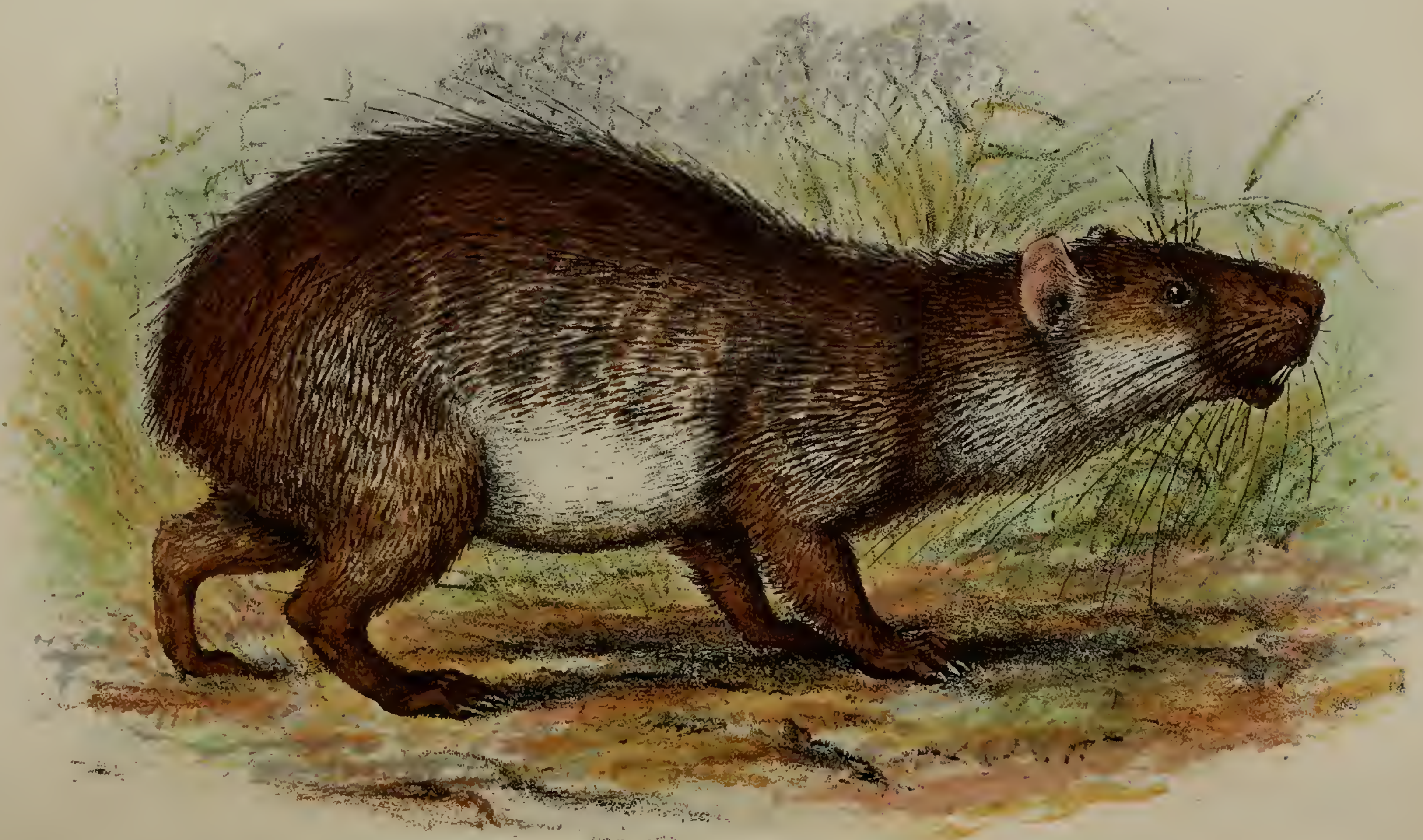
NATURAL HISTORY



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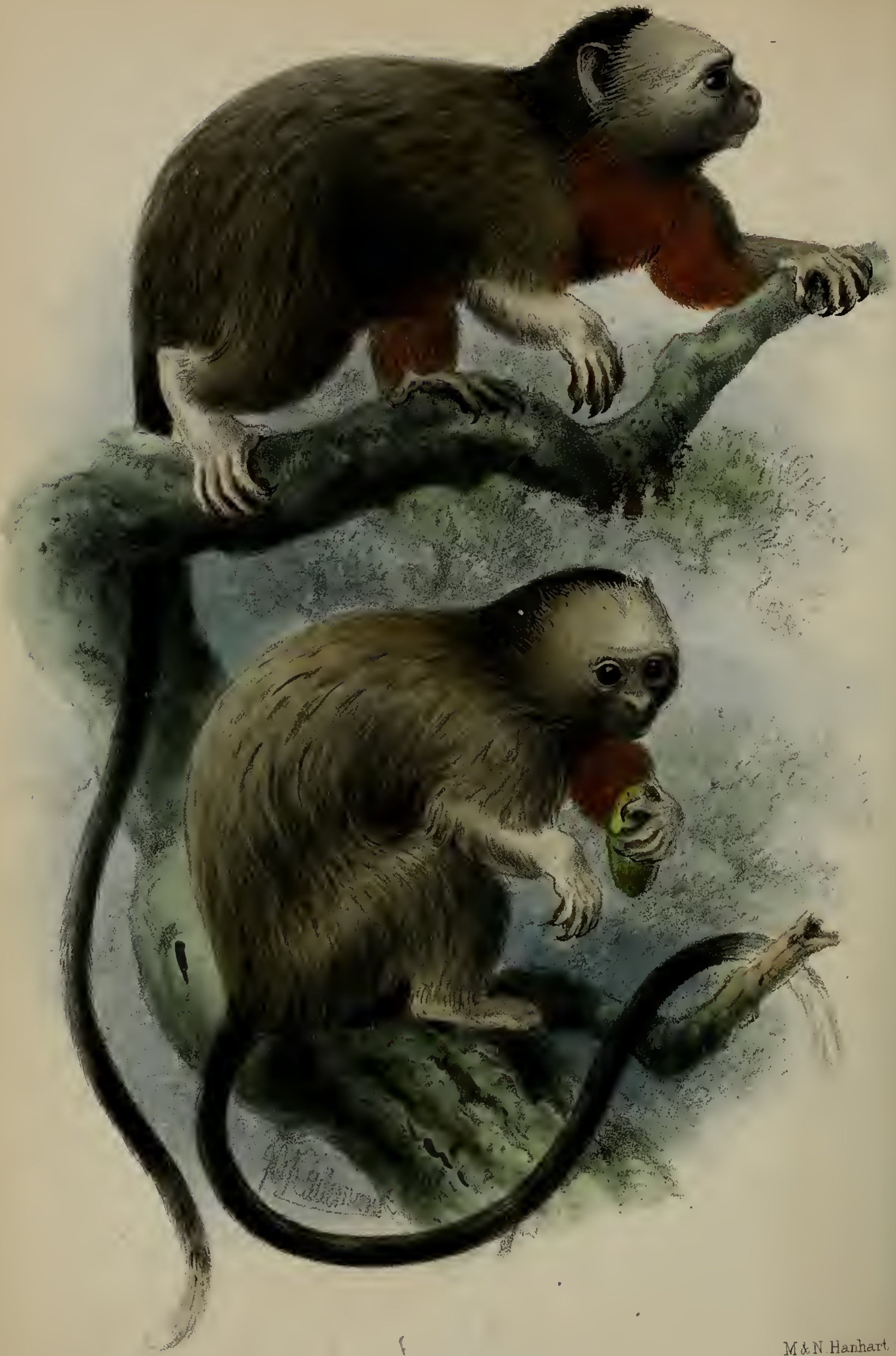
Mintern Bros. imp.

TRICHYS LIPURA.



J. G. Keulemans lith.

M & N. Hanhart imp.

HAPALE LEUCOPUS.

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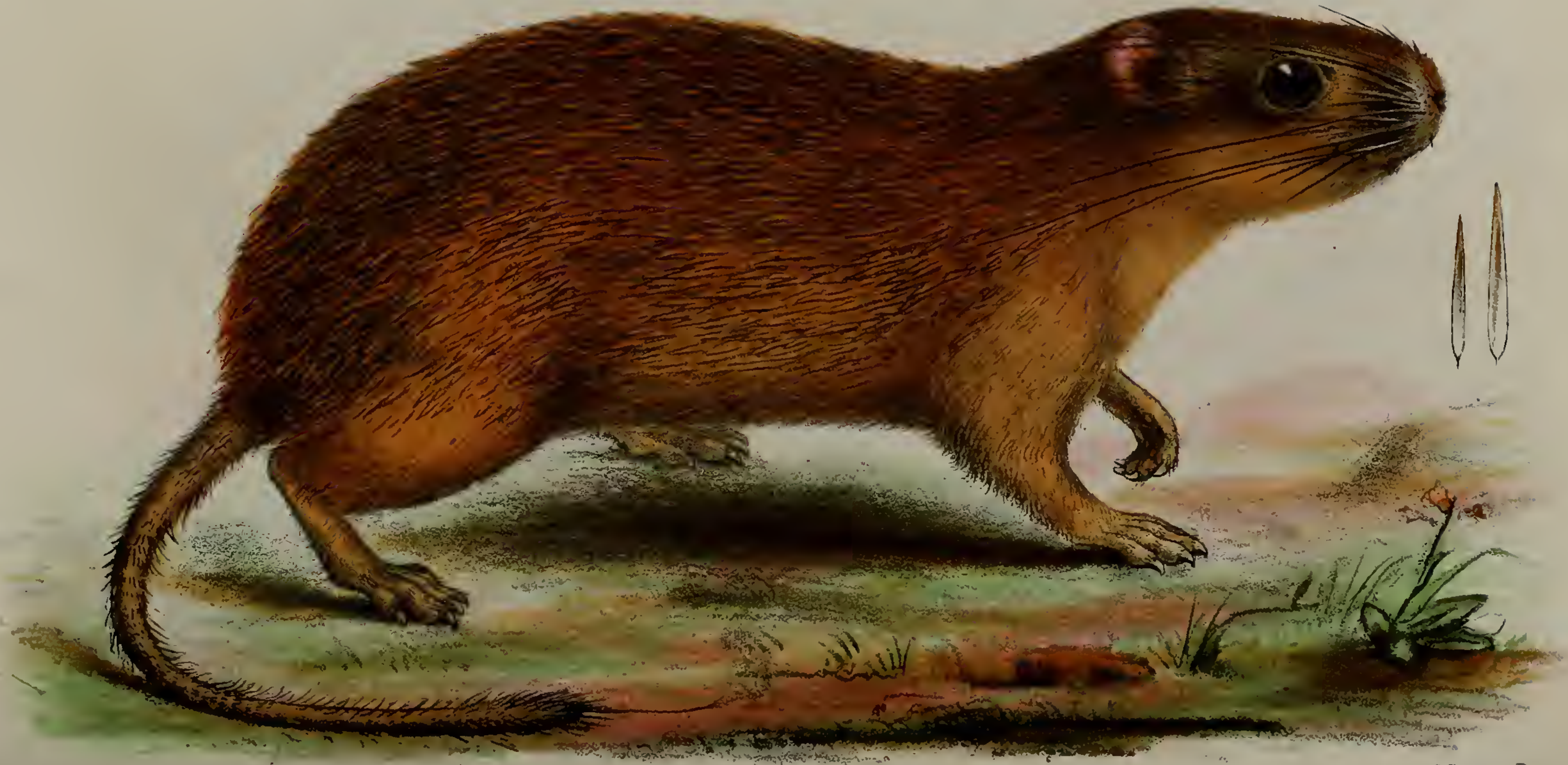


R. Mintern del. et lith.

Mintern Bros imp

ECHIMYS FERRUGINEUS.

species of *Nyctinomus*, and resemble *Myopterus*), in their distinctly separated ears, in the possession of six lower incisors, and in the presence of a glandular gular sac. These characters appear sufficient to unite them in a subgenus at least. But *N. norfolcensis* has an additional upper premolar, which is even better developed than in other species of the genus, and therefore belongs to the subgenus *Nyctinomus*; while *N. albiventer* and *N. acetabulosus*, on account of the absence of this small premolar, are relegated to the subgenus *Mormopterus*.

It is therefore impossible, in a natural arrangement of the species, to separate *N. albiventer* and *N. acetabulosus* into a distinct subgenus characterized by the number of the upper premolars; for this would exclude *N. norfolcensis*, which is, undoubtedly, in all other respects, very closely allied to them, and forms with them a well-defined section of the genus.

3. Report on some of the Additions to the Collection of Mammalia in the British Museum. By Dr. ALBERT GÜNTHER, F.R.S., V.P.Z.S., Keeper of the Zoological Department.

[Received November 6, 1876.]

(Plates LXIX–LXXIV.)

1. *On a Collection from the Philippine Islands.*

A small collection made by Professor Steere in the Philippine Islands gives some additional information as regards the distribution of certain species in that group. It contains:—

Macacus philippinensis (Is. Geoffr.).

This Monkey was procured in the mountains of Mahayhay, in the island of Luzon, near Manila. Dr. Steere also shot the same species, or apparently the same, in the islands of Palawan, Mindanao, and Basilan. They go in large troops, and are often seen along the sea-shore, where they seem to be occupied in hunting for shell-fish and crabs.

Galeopithecus philippinensis (Waterh.), from Bojol.
Pteropus jubatus (Temm.), from Mindanao.
Tupaia javanica (Horsf.), from Palawan.
Viverra tangalunga (Gray), from Panay.
Sciurus exilis (S. Müll.), from Basilan (also found in Mindanao).
Sciurus steerii (sp. n.),

SCIURUS STEERII (Plate LXIX).

Dr. Steere's collection contained two examples of this apparently undescribed species, which greatly differ in coloration, but are structurally quite identical:—

1. A specimen obtained from Balabac (marked 6510) has the upper parts, sides of the body and outer side of the legs, of a rich chestnut-brown colour, the hairs being tipped with black, which gives the fur a grizzled appearance. All the lower parts are brownish red.

Hairs of the tail of moderate length, rather stiff, bright brownish red, each hair with a broad black ring.

2. The second specimen is from Puerto Princesa, Palawan (numbered 6798); it has the upper part of the head, the middle of the back, and the outer side of the legs grizzled with greyish brown and black, each hair having a black ring and black tip. Sides of the body similarly grizzled, but mixed with numerous white hairs. Lower parts pure white, with the exception of the root of the tail; anal region and borders of the white abdomen brownish red. Coloration of tail as in the first specimen, but with the tip black.

	Specimen 1. in.	Specimen 2. in.
Distance from end of snout to root of tail ..	9½ ♀.	9 ♂.
Length of tail	6½	7
Length of naked sole of hind foot	1½	1½
Length of skull		2

2. *On a Collection from Borneo.*

Mr. H. Low has brought with him to England a second collection, from the same district in which the specimens described in a former paper (p. 424) were obtained. It contains two molar teeth of an adult Elephant undistinguishable from those of *Elephas indicus*. They had been evidently exposed for a long time to the deteriorating influences of the weather; and although Elephants are no longer found in the immediate vicinity of the west coast, Mr. Low has reliable information of their occurrence in the interior, and has no doubt of this animal being indigenous in Borneo, and not merely an importation.

The following species prove to be undescribed:—

LUTRA LOWII, sp. nov.

Entirely chocolate-brown, nearly black along the middle line of the back. Lips and chin to the level of the ears white, cheeks and throat brown. The white of the upper lip extends upwards nearly to the nostril, and is sharply defined towards the brown part of the snout. Bristles arising from brown parts are black, those from white parts white. Ears conspicuous.

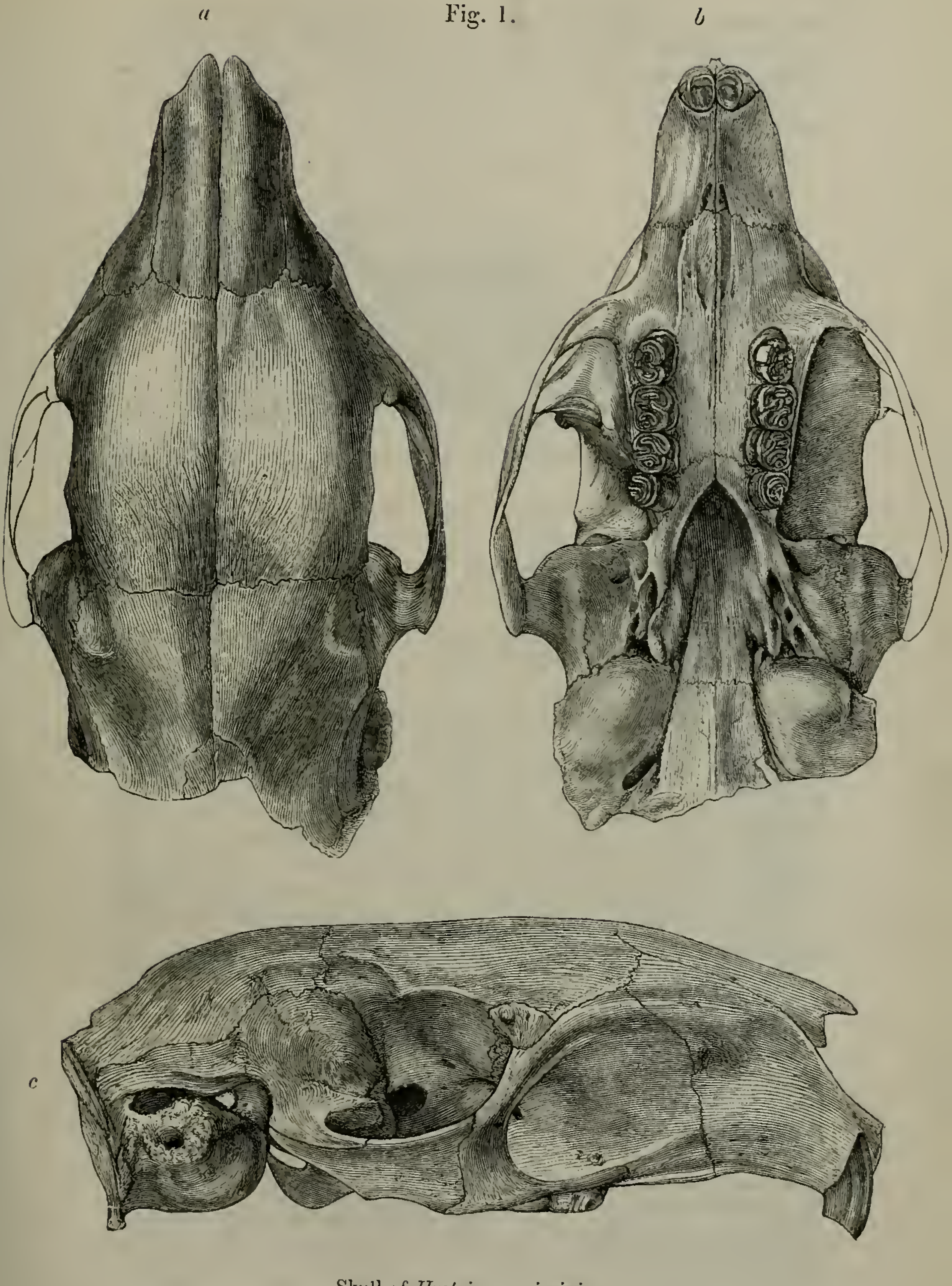
	in.
Distance of nose from vent......	23
Length of tail	11

Distinguished from *Lutra simung* by its much shorter tail.

HYSTRIX CRASSISPINIS, sp. nov. (Plate LXX.)

This species, which belongs to the same section as *H. javanica* and the allied species, is distinguished from all by the great size and length of the quills, all of which, moreover, are more or less distinctly grooved above, or at least provided with ridges. It is conspicuously smaller than *H. javanica*, but agrees with it in being covered everywhere with stiff spines, except on the foremost part of the head and abdomen. The largest quills are, in the middle, about twice as thick

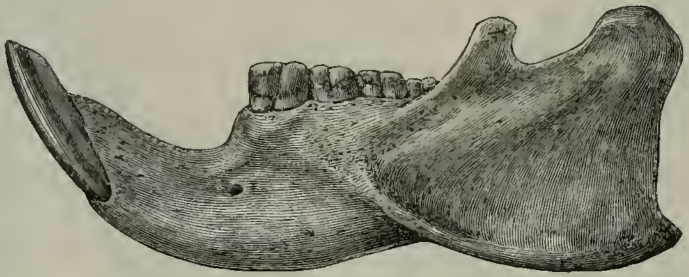
Fig. 1.



Skull of *Hystrix crassispinis*.

as an incisor. The prevailing hue of the head and fore part of the body is a greyish brown; but towards the large quills the spines are getting whitish at the tip and base. The basal half of the large quills is white, the apical half black with white tip. Slender quills white, with black subcentral ring. Legs blackish*.

Fig. 1a.



Lower jaw of *Hystrix crassispinis*.

	in.	lin.
Length of body from tip of nose to root of tail....	17	0
Length from nose to ear....................	3	6
Length of tail with terminal quills..............	6	0
Length of fore foot.........................	2	0
Length of hind foot	3	0
Length of one of the largest quills..............	7	0
Length of one of the hollow caudal quills	6	0

Mr. Low brought home four specimens of this species. The existence of a Porcupine in Borneo has been repeatedly mentioned, for instance by Müller, Verhandl. Nat. Gesch. Ned. Overz. Bezitt. p. 36 (under the erroneous name of *Hystrix fasciculata*), and by W. Marshall, Proc. Zool. Soc. 1871, p. 235, who refers a very young example in the Leyden Museum to Marsden's *H. longicauda* from Sumatra. From the notes of the Dutch naturalists it is impossible to decide whether the specimens examined by them belong to our species, or whether a second species exists in the island, approaching in size, and perhaps identical with, the Sumatran or Malaccan form.

The *Skull* (figs. 1, 1a, pp. 737–8) is distinguished by the shortness of the nasal bones, which are shorter than, or as long as, the frontal suture. The anterior portion of the frontal region is not very convex. Ascending ramus of the intermaxillary broad, about as broad as one of the nasal bones. Infraorbital opening of comparatively moderate width. The palatal incision advancing forwards to the front margin of the hinder molar.

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* On the inner side of one of the skins, in which the subcutaneous tissues have been cleared away, the arrangement of the large quills may be distinctly seen. These quills are not uniformly distributed over the hinder half of the back, but their roots are collected in bundles of five, six, or seven, the bundles having the appearance of imbricated pectinated scales. The roots of the largest and thickest quills occupy the middle of each scale or bundle. A similar arrangement has been figured by F. Cuvier, Nouv. Ann. Mus. Paris, i. pl. xv. fig. 1.

I give some of the measurements of two skulls, one (A) being that of an old, the other (B) of a younger, though full-grown, individual.

	A. millim.	B. millim.
Total length	110	110
Length of nasal bone	33	38
Length of frontal suture	39	38
Least width of nasal bone	9	8
Length of fronto-intermaxillary suture	9	7
Least width of interorbital space	39	40
Distance between incisor and first molar	29	30
Length of upper molar series	24	25
Width of palate between the second molars	9	8

The skull of this species resembles much that figured by Blainville (Ostéogr. *Hystrix*, pl. ii.) under the name of *Atherura fasciculata*. I have not seen the skull of this species; but I should have expected it to be more similar to that of *A. macrura* than it would appear from Blainville's figure.

TRICHYS, g. n.

Allied to *Atherura*, but with the tail reduced to a scarcely perceptible projection of the skin. Dentition as in *Atherura*, but with the lower incisors more compressed. Facial portion of the skull compressed, without enlargement of the air-sinuses. A postorbital process.

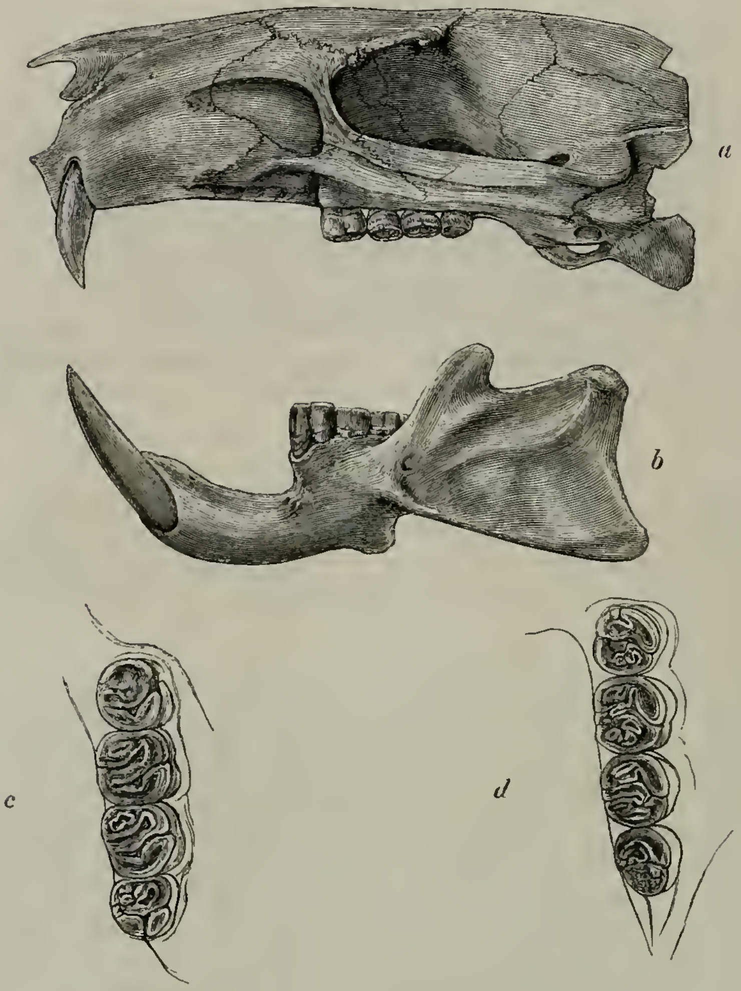
TRICHYS LIPURA, sp, n. (Plate LXXI.)

All the upper and lateral parts of the body are densely covered with flat flexible bristles of moderate length, grooved on the upper as well as lower surface. Underfur very scantily represented by fine woolly hairs; and on the rump some long hair-like bristles project beyond the flat ones. On the head and abdomen the bristles are replaced by flat stiff hairs. In the external form and structure of the head, ears, and feet there is no marked difference from *Atherura*, The general tint of the upper parts of the animal is brown, each spine being white at the base, and brown towards the point. On the sides the brown colour gradually passes into the white of the lower parts. Hairs of the long moustache black, the longest hairs having whitish terminations.

	in.	lin.
Total length	17	0
Distance from nose to ear	3	0
Length of ear	1	0
Length of sole of fore foot	1	6
Length of sole of hind foot	2	6
Length of one of the longest flat spines	1	8

Skull (figs. 2, 2^a, pp. 740–1).—The following notes refer chiefly to points in which *Trichys* differs from *Atherura*. Especially remarkable is the development of a postorbital process, and of the coronoid process, in which this form differs from most of the other members of the group of Porcupines.

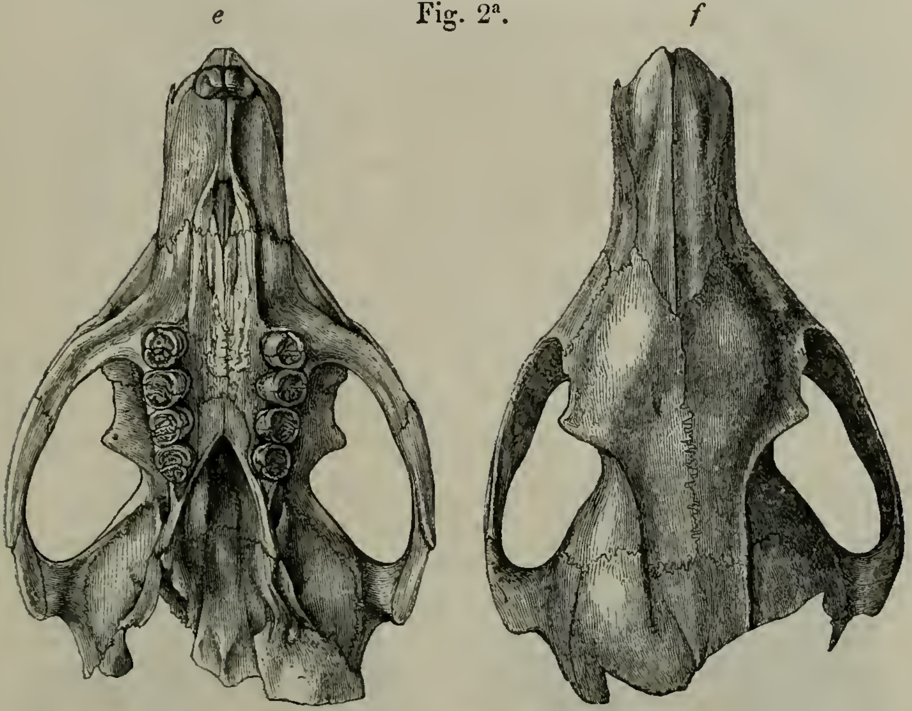
Fig. 2.



a. Skull of *Trichys lipura*, nat. size. *b*. Lower jaw, nat. size. *c*. Lower molars; *d*. Upper molars: twice nat. size.

The facial portion of the skull is compressed and rather elongate, the nasal bones quite as long as the frontal suture, and extending far more backwards than the suture between intermaxillary and frontal. Frontals rather flat above, with projecting postorbital process, behind which the skull is constricted. The zygomatic arch is strong, deeply channelled along its whole length, and expanded along its lower edge; malar with projecting infero-posterior angle. Palate with a projecting ridge on each side, commencing from the first molar, the ridges converging in front of the foramina incisiva. Palatal notch opposite to the space between the third and fourth molars. Coronoid process well developed, rising above the level of the condyle. A very conspicuous projection on the lower edge of the mandible marks the boundary between the incisive and molar portions of the bone.

Fig. 2^{a}.



Skull of *Trichys lipura*, natural size.

The animal described is undoubtedly the same as that of which a fragmentary skull has been figured by M. Gervais, Voy. Bonite, Mamm. pl. 11. figs. 4–6. The author thought it to be identical with *Hystrix macrura* (Gm.). As far as I can make out from his description, his materials were:—

1. A dried example, said to have been brought by the naturalists of 'La Bonite' from Sumatra*, where it is called "Landa Kloele." *This specimen is also tailless*; but M. Gervais adds that he had convinced himself, "qu'il avait été mutilé, lors de la préparation." No mutilation of any kind has taken place in our Bornean specimen brought by Mr. Low, who, besides, assures me that the natives had told him that this species was tailless.

2. The fragmentary skull taken from that skin, figured by M. Gervais, about the identity of which with that of our animal there cannot be any doubt.

3. But, singularly, M. Gervais refers further to this species the skeleton of a long-tailed Porcupine with twenty-one caudal vertebræ†,

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* According to Eydoux's Itinerary, the expedition did not touch at Sumatra (Voy. Bonite, Zool. i. p. xiii.).

† The numbers of vertebræ are differently given on p. 63; but "*Acanthion macrourum*" is probably a slip of the pen.

brought to the Paris Museum by Diard and Duvaucel (p. 62). With the evidence of two tailless specimens before us, we may well be justified in supposing that this skeleton does not belong to the same species of which he has figured the skull.

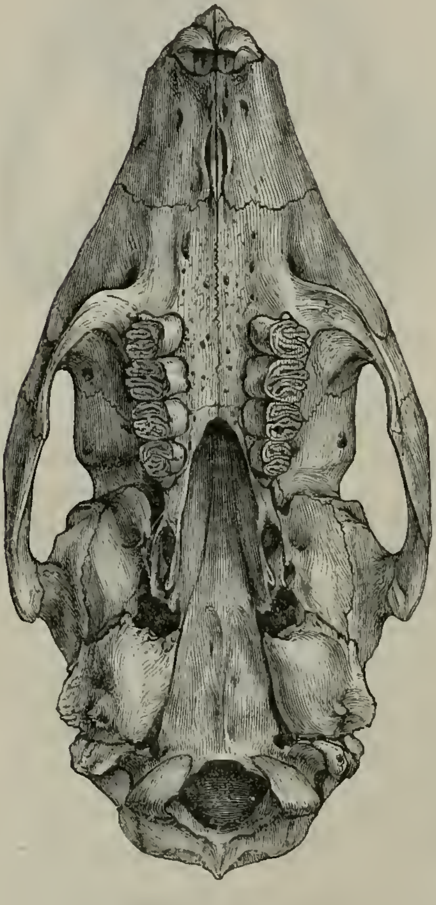
3. *On the Cranial Differences of the species of* Atherura.

Of the three species of *Atherura*, viz. :—

1. *A. fasciculata* (Waterh., ? Shaw), from Siam, with simple, flattened caudal bristles ;

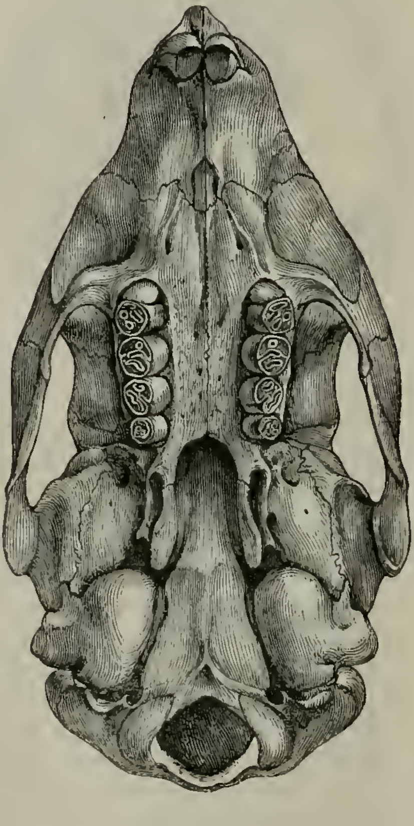
2. *A. macrura* (L., Waterh.)=*fasciculata* (Gray, Cantor), from the Malayan Province, with twisted and irregularly dilated caudal bristles ; and

Fig. 3.



Atherura macrura.

Fig. 4.



Atherura africana.

3. *A. africana* (Gray), from the west coast of Africa, with caudal bristles as in the preceding*,—

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* I have repeatedly (for instance, P. Z. S. 1867, p. 103) drawn attention to

I know the two latter only. Although readily distinguished in the adult state, they are sufficiently similar when young to render the determination of examples, the origin of which is unknown, a matter of some uncertainty. The skulls, however, show constant, though slight, distinctive characters.

In *Atherura macrura* (fig. 3, p. 742) the foramina incisiva are extremely narrow slits which run in an almost parallel direction, and are very close together. The palatal notch advances far forwards, to the level of the third molar. The alisphenoid is very thin, but slightly bent outwards.

In *Atherura africana* (fig. 4, p. 742) the incisive foramina are narrow, but conspicuously wider and much more distant than in the Malayan species, and divergent behind. The roof of the palate extends far backwards, its hind margin being behind the level of the last molar. The alisphenoid forms a broad and rather thickened ramus, bent outwards and much produced backwards.

4. *On some new Mammals from Tropical America.*

HAPALE LEUCOPUS. (Plate LXXII.)

Upper and lateral parts of the body covered with silky hair of moderate length and brownish-grey colour, darkest on the nape of the neck and occiput; face and head with short sparse white hair. Ears large, naked, without tuft. Throat greyish brown; lower parts of the body and inside of the legs rusty red; forearm, hands, and feet white. Tail short-haired, blackish or black, with white extremity.

The female differs from the male in the hairs of the upper parts having silvery white tips.

Length of head and body $11\frac{1}{2}$ in., of tail $14\frac{1}{2}$ in.

Number of vertebræ: cervical 7, dorsal 12, lumbar 7, sacral 3, caudal 31–33.

Medellin. Several specimens, identical in coloration, collected by Mr. T. K. Salmon near Medellin, Antioquia, U. S. of Columbia.

DACTYLOMYS TYPUS (Is. Geoffr.).

We have received two fine skins of this rare Rodent, unfortunately without skulls, from the Rio Napo.

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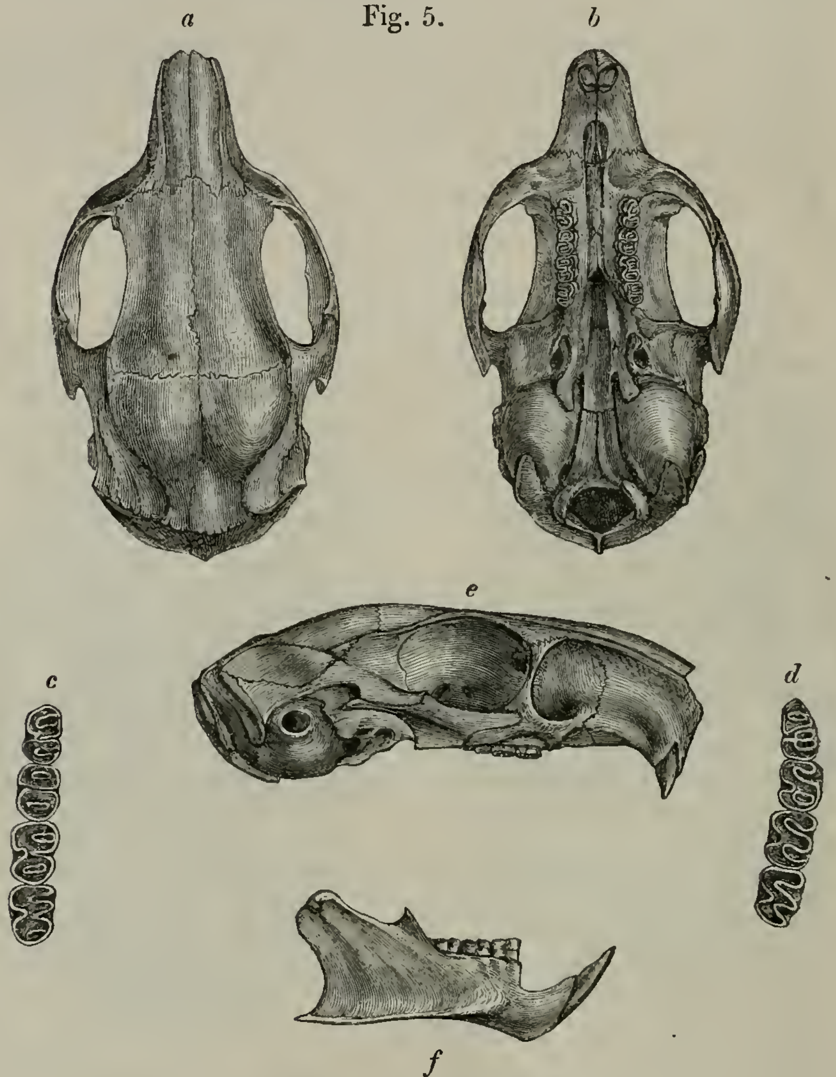
the occurrence on the coast of West Africa of freshwater fishes previously considered to be exclusively typical of the Indian region.

That these instances escaped the notice of naturalists who have recently discussed the relations of the African and Indian faunas is to me less surprising than the omission of a not less singular fact, viz. the reappearance of *Atherura* on the West-African coast. It strongly confirms Mr. Wallace's view that there is present, in the Mammals and Birds of West Africa, a special Oriental or even Malayan element (Geogr. Distrib. i. p. 263). Instances of this kind appear to me to be of infinitely greater weight in solving the problem of the mode of dispersion of animals over the globe (or their genesis) than deductions drawn from lists of genera vaguely or artificially defined. On this occasion I may also be allowed to refer to, and thus, perhaps, save from oblivion, some remarks in Rept. Brit. Ind. Introduct. p. viii, in which, I believe, for the first time, the occurrence of African Reptilian types in the Indian Region has been distinctly stated.

Lasiuromys villosus (Dev.).

A single specimen was in the collection made by Mr. E. Bartlett on the Huallaga river, and is preserved in spirits. It is an adult female. Being almost destitute of hairs about the head, and the skin of this part being so much injured that nothing could be ascertained about its external appearance, the skull has been removed. The tail had been mutilated during the lifetime of the specimen. The trunk and limbs are in good condition.

Fig. 5.



Skull of *Lasiuromys villosus*.
c, upper molars; *d*, lower molars: magnified.

The fur consists of uniformly soft, dense, almost woolly hair of moderate length. Tail densely hairy, the hairs being as dense and long as those on the back. Colour uniform bright brownish yellow somewhat less bright towards the head, and becoming darker towards the middle of the tail. The mutilated tail measures four inches, and appears to have been twice that length when perfect. The ears seem to have been small; claws of proportionate strength.

	in.	lin.
Length of trunk (without head)	7	6
Length of sole of fore foot (with claws)	1	0
Length of hind foot	1	10
Length of third and fourth toes	0	7

The facial portion of the *skull* (fig. 5, p. 744) is very short, the distance between the incisors and first molar being equal to the length of the molar series. The molar series diverge very slightly in front. Molar teeth distinctly longer than wide, with internal enamel-fold deeply penetrating the tooth and sometimes crossing it without interruption. The palatal notch advances to the level of the middle of the third molar. Vertical occipital crest developed.

	millim.
Length of the entire skull	57
Length of nasal bones	15
Length of frontal suture	22
Least width of the frontals	15
Distance between the incisor and first molar	12
Length of upper molar series	12
Width of palate between the second molars	3
Length of first upper molar	3
Length of second upper molar	3
Length of third upper molar	3½
Length of fourth upper molar	2½
Length of lower molar series	13

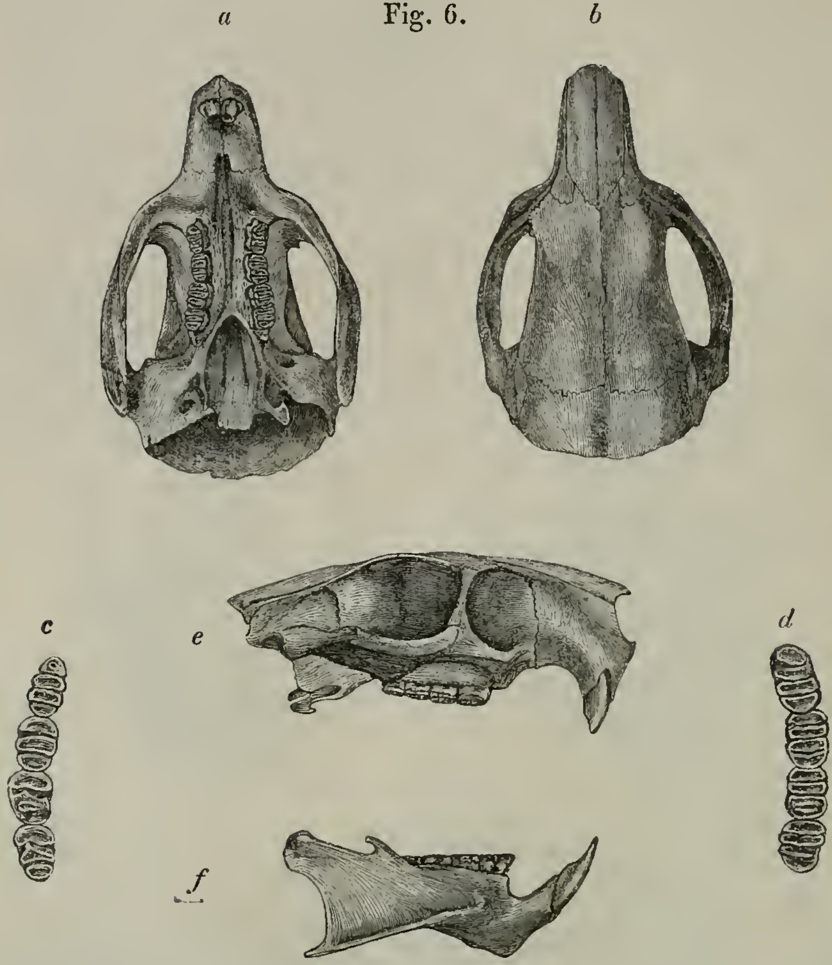
LONCHERES CANICEPS. (Plate LXXIII.)

Fur of uniform softness, without any spines. Tail rather densely covered with short hairs, below which the scales are more or less visible; towards the end of the tail the hairs are thicker, entirely hiding the scales. Upper parts rusty brown, with an admixture of some black hairs. Head to behind the eyes grey. Lower parts reddish white. Feet greyish, toes whitish. Tail black.

	in.	lin.
Length of head and body	11	0
,, tail	7	6
Distance between nose and eye	1	0
Length of fore foot	1	0
,, hind foot	1	10

This species belongs to the group with short snout, the distance between incisors and molars being considerably less than the length of the molar series. The molar series diverge in front as well as behind in both jaws. The single molar teeth are long, especially the first. The enamel-folds traverse generally the entire width of the teeth.

Fig. 6.



Skull of *Loncheres caniceps*.
c, lower molors; *d*, upper molars: twice nat. size.

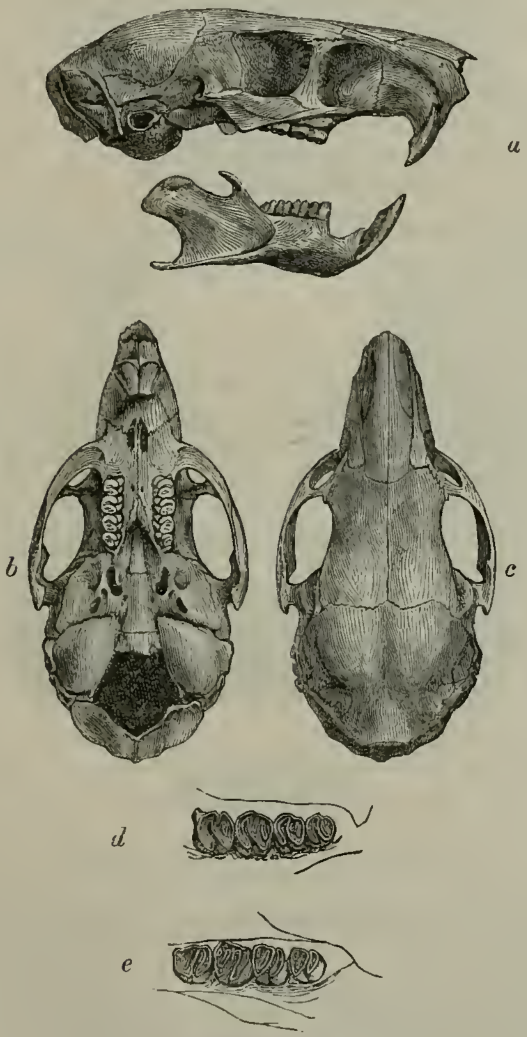
	millim.
Length of nasal bones	18
,, frontal suture	20
Distance between upper incisor and first molar	10
Length of upper molar series	13½
Width of palate between first molars	3½
,, ,, second molars	3
,, ,, fourth molar	5½
Length of first upper molar	4
,, second molar	3½
,, third, as well as fourth molar	3
,, first lower molar	4
,, second, third, or fourth molar	3½

Skin of an adult male from Medellin, collected by Mr. T. K. Salmon.

ECHIMYS DIMIDIATUS.

Fur composed of hairs only, somewhat harsh to the touch, and of moderate length. Tail nearly naked, covered with very small scales, pencilled at its extremity. Upper and lateral parts uniform brown, lower parts of a pure white; the two colours sharply defined. The white colour extends in a narrow stripe round the upper lip, and occupies also the lower half of the tail. Feet brownish grey, toes

Fig. 7.



Skull of *Echimys dimidiatus*.

d, upper molars; *e*, lower molars: twice nat. size.

whitish. Ears of moderate size. Claws feeble. Tail not much shorter than the body.

	in.	lin.
Length of head and body	7	6
„ tail	6	6
„ hind foot	1	9

The palatal notch extends far forwards, nearly to the level of the front margin of the third molar.

	millim.
Total length of skull	47
Length of nasal bones	17
„ frontal suture	14
Least width of frontals	11
Distance between incisor and first molar	9
Length of upper molar series	8
„ lower molar series	8

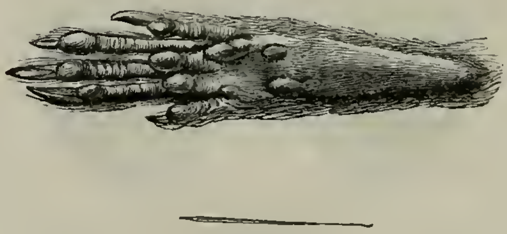
A fully adult male (stuffed) has been in the Museum for many years; nothing is known of its history beyond that it was presented by the Earl of Derby.

ECHIMYS BREVICAUDA.

Echimys brachyurus, Waterh. Mamm. ii. p. 345 (not synon.).

Fur composed of rigid hairs of moderate length, which, although flattened and channelled, are so narrow and flexible as not to merit the term of spines. Tail scaly, with scattered hairs. Upper parts brownish red, the hairs having black tips; sides similarly coloured, but of a lighter shade; throat and sides of the abdomen reddish white, middle of the abdomen white. Feet and tail greyish. Thumb scarcely detached, but distinctly clawed; the third and fourth fingers project about two lines beyond the second. The three middle toes are armed with rather strong claws and of nearly the same length. Ears of moderate size. Tail much shorter than the body.

Fig. 8.

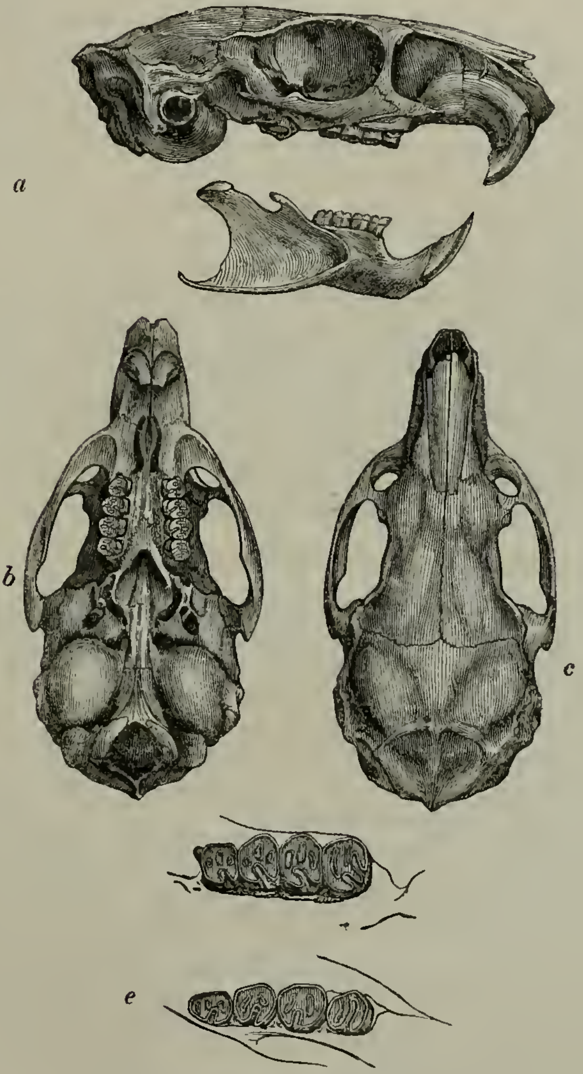


Foot and spine of *Echimys brevicauda.*

	in.	lin.
Length of head and body	9	0
„ tail	5	11

	in.	lin.
Distance between nose and eye	0	11
Length of fore foot	0	10½
„ hind foot	1	11

Fig. 9.



Skull of *Echimys brevicauda*.
d, upper molars; *e*, lower molars: twice nat. size.

The *skull* and *dentition* appear to differ scarcely from those of *Cercomys cunicularius* and *Echimys cayennensis*. The palatal notch is on a level with the hind margin of the last molar.

	millim.
Total length of skull	56
Length of nasal bones	20
,, frontal suture	16
Distance between incisor and first molar	12
Length of upper molar series	9
,, lower molar series	9

An adult male in spirits and the skin of an adult female were brought by Mr. E. Bartlett from Chamicuros, Huallaga river.

I believe that the specimen in the British Museum from Bolivia, noticed by Mr. Waterhouse as *E. inermis* (Mamm. ii. p. 498, pl. 16. fig. 5), is not specifically distinct from the Huallaga specimen. Its fur is somewhat less harsh than that of the latter, and its throat is white; but the skulls of both examples are entirely alike. Unfortunately the tail is lost. The true *Echimys inermis* of Pictet has a considerably longer tail than *E. brevicauda*.

Nor can there be any doubt that the two specimens from Chinore, which Mr. Waterhouse determined as *E. brachyurus*, are only the young of the same species. I removed the skull from the larger individual, and found only three molars developed. These examples, as well as the one named "*E. inermis*," are from the same collection, made by Mr. Bridges in Bolivia.

Echimys semispinosus (Tomes) differs in having the spines more strongly developed, and in its coloration.

ECHIMYS FERRUGINEUS. (Plate LXXIV.)

This species is allied to those which have been described under the names of *hispidus*, *spinosus*, and *brachyurus*, but is distinguished from the first by its shorter tail, from *E. spinosus* (Licht.) or *brachyurus* (Wagn.) by its shorter hind foot, and from *E. spinosus* of Rengger by a longer tail.

The whole of the upper and lateral parts is covered with spines, which are strong and broad on the middle and posterior parts of the body, becoming weaker towards the head and limbs, only the foremost part of the nose and cheeks being covered with hairs. Tail covered by large scales, with intermixed longish hairs sparse on the proximal half, but more dense towards its extremity, which terminates in a single very long fine hair. Upper parts and sides of a bright rusty red, shaded with greyish along the middle of the head and back and on the sides of the neck, each bristle having a greyish ring near the point, which is red. All the lower parts and limbs salmon-coloured. Lower lip and toes whitish. Tail grey. Ears of moderate size; claws of proportionate strength.

	in.	lin.
Length of head and body	6	3
,, tail	4	0
,, hind foot	1	3
,, longest bristle		11
Width of longest bristle		$0\frac{3}{4}$

The palatal notch extends forwards to the level of the middle of the third molar.

	millim.
Total length of skull	44
Length of nasal bones	13
,, frontal suture	14½
Least width of frontals	11
Distance between incisor and first molar	8½
Length of upper molar series	8
,, lower molar series	8

The skin of a fully adult male was obtained by Mr. E. Bartlett at Chamicuros, Huallaga River.

November 21, 1876.

Prof. W. H. Flower, V.P., F.R.S., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of October 1876.

The total number of registered additions to the Society's Menagerie during the month of October was 91, of which 52 were acquired by presentation, 18 by purchase, 2 by exchange, 2 were bred in the Gardens, and 17 were received on deposit. The total number of departures during the same period, by death and removals was 155.

Mr. Sclater exhibited the skin of a young Rhinoceros belonging to Mr. W. Jamrach.

The animal had been captured in the Sunderbunds, near the Ray Mangal river, in May last, and brought immediately to Calcutta, where it only lived 24 hours. Mr. Sclater called attention to the folds in the skin, which were exactly those of *Rh. sondaicus*, though it remained to be proved whether the Rhinoceros of the Sunderbunds was really identical with the Malaccan and Javan forms. According to Mr. Jamrach's information, the females of the species obtained in the Sunderbunds were entirely destitute of any horn *, which would appear not to be the case in the Javan animal. Mr. Sclater believed that this was the first specimen of the Rhinoceros of the Sunderbunds that had been brought to this country.

The Secretary exhibited, on the part of Mr. A. Anderson, F.Z.S., a coloured drawing of *Emys hamiltonii*, taken from life, from a specimen that was captured at Futtehgurh (Ganges) in April last. The occurrence of this, our handsomest emydine in India, a species chiefly confined to Lower Bengal, so far west as Futtehgurh (some 700 miles) was stated by Mr. Anderson to be of great interest. It proved, on dissection, to be a female, and measured across the carapace 10×9·6 inches.

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* The *Rhinoceros inermis* of Lesson (Compl. aux œuvres de Buff. ed. 2, vol. i. p. 514) appears to have been based on such a female.—P. L. S.

A letter was read from Count T. Salvadori, C.M.Z.S., containing the following remarks on some of the birds mentioned by Signor D'Albertis as seen by him during his first excursion up the Fly River (P. Z. S. 1876, p. 414; Ibis, 1876, pp. 359–362).

"Signor D'Albertis has not sent any specimens from the Fly River of the following species:—*Paradisea raggiana*, *Tadorna* sp., *Manucodia viridis*, *Epimachus magnificus*, *Microglossus aterrimus*, and *Ceyx solitaria*; so that these species are not included in my Catalogue of D'Albertis's second collection"*.

As regards the *Paradisea raggiana*, although Signor D'Albertis must be the one who best knows this bird, the most splendid of his discoveries, still as he does not state that he has killed any specimen of it along the Fly River, I should like to compare specimens of this locality with those of Hall Bay. I must say that I was rather inclined to think that the Bird of Paradise from the Fly River might be of a different species, as is the case with the *Goura* which I have lately described as *G. sclateri*, and which is certainly different from *G. albertisi*. The *G. sclateri* has been mentioned by Signor D'Albertis as *Goura*, sp. inc. (P. Z. S. 1876, p. 414), and again with only the generic name of Crowned Pigeon (*Goura*) in 'The Ibis.' I cannot help thinking that *Manucodia viridis* has been mistaken for the widely spread species *M. atra*, which is also found at Hall Bay and on the Aru Islands; while *M. viridis*, so far as I know, has a very limited range, and has only been found on the north-west peninsula. It would also be interesting to examine specimens of the *Epimachus* called *magnificus*, as it may happen that the bird from the Fly River belongs to the Cape-York form (*E. alberti*).

Signor D'Albertis has sent specimens of the birds named by him *Tanysiptera dea* and *Halcyon nigrocyanea*; and these are respectively *Tanysiptera galatea*, var. *minor*, and *Cyanalcyon stictolæma* of my catalogue. *C. stictolæma* is a beautiful species, allied to *C. nigrocyanea*, but certainly different.

The following papers were read:—

1. Descriptions of six new Species of Shells from the Collections of the Marchioness Paulucci and Dr. Prevost. By G. B. Sowerby, jun.

[Received October 27, 1876.]

(Plate LXXV.)

Conus pauluccíæ, sp. nov. (Plate LXXV. fig. 3.)

C. *testa elongata, solidula, obsolete striata, obtusissime angulata, antice attenuata, albida aurantiaco late interruptim fasciata,*

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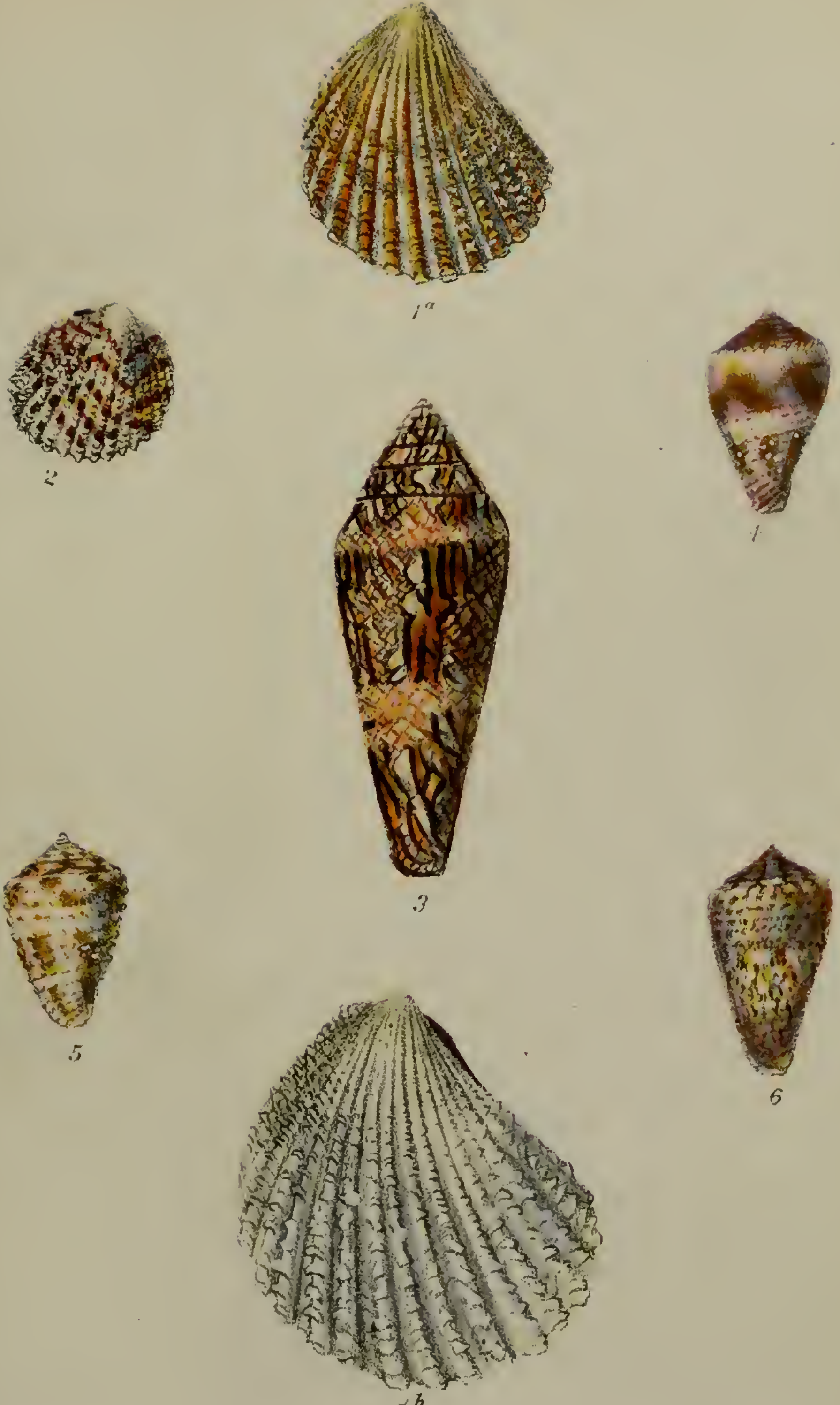
* "Catalogo di una seconda collezione di uccelli raccolti dal Sig. L. M. D'Albertis nell' isola Yule e sulla vicina costa della Nuova Guinea e di una piccola collezione della regione bagnata dal fiume Fly," Ann. Mus. Civ. di Storia Nat. di Genova, ix. pp. 7–49, Ottobre 1876.



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M & N Hanhart imp.

NEW SHELLS FROM THE EASTERN HEMISPHERE

BRITISH MUSEUM
NATURAL HISTORY

fasciis castaneo-fusco longitudinaliter strigatis, aliter lineis aurantiacis eximie trigono-reticulata; spira pyramidali, anfractibus leviter spiraliter sulcatis; apertura angusta, alba.

Long. 60, lat. maj. 20 mill.; spira alt. 19 mill., apertura lat. maj. 5, min. 2 mill.

Hab. Mauritius.

Shell elongated, rather solid, obsoletely striated, very obtusely angulated behind, and gracefully attenuated to the front, whitish, with broad interrupted bands of orange, longitudinally streaked with chestnut-brown, intersected by an exquisite network composed of triangular orange lines; spire pyramidal, whorls faintly spirally grooved; aperture narrow, white.

This beautiful species, belonging to the interesting collection of the Marchioness Paulucci, of Florence, forms a striking addition to the subgenus *Cylinder*, or "*textile*" group of Cones. In general form it resembles *C. gloria-maris*; but it differs from that valuable species in the formation of the spire, the whorls being much less concave and the angle of the body-whorl more rounded. In colour and marking it closely resembles *C. aureus*; but it is of a much more tapering form than that species, and its surface is much smoother.

CONUS SUPERSCRIPTUS, sp. nov. (Plate LXXV. fig. 4.)

C. *testa oblonga, solidiuscula, angulata, turgidula, lævi, antice valide sulcata, albida cæruleo tincta, maculis grandibus fulvis irregulariter ornata, fasciis frequentibus angustis maculatis et quasi literatis cincta; spira abbreviata, fulvo strigata, anfractibus concaviusculis, spiraliter sulcatis; apice acuto, roseo; apertura subangusta, fauce purpureo-fusco tincta.*

Long. 27, lat. 14 mill., apert. lat. maj. 4, min. 2 mill.

Hab. Madagascar.

Shell oblong, rather solid, angular, somewhat swollen, smooth, strongly grooved in front, whitish tinged with blue, irregularly ornamented with large yellowish blotches, and encircled with numerous narrow bands composed of letter-like spots; spire short, marked with radiating stripes of the same tawny colour as the spots on the body-whorl, whorls rather concave, spirally grooved; apex acute, rose-coloured; aperture rather narrow, interior tinged with purplish brown. This shell also belongs to the Marchioness Paulucci, and is the only specimen I have seen. Though of simple form, it is quite distinct from any hitherto known species. Its bluish tinge of colour and delicate letter-like markings are remarkable.

CONUS BACCATUS, sp. nov. (Plate LXXV. fig. 5.)

C. *testa abbreviato-turbinata, turgidula, minutissime decussata, conspicue seriatim granulata, albida, maculis aurantiacis grandibus trifasciata; spira acuta, brevi; anfractibus concavis, fere lævibus, ultimo biangulato.*

Long. 23, lat. maj. 15 mill.

Shell short, rather swollen, very minutely decussated, with regular rows of conspicuous granules, whitish, with large orange blotches arranged in three bands; spire acute, short, whorls concave, nearly smooth, last whorl biangulated.

This interesting little Cone belongs to the rich collection of Dr. Prevost, of Alençon. Apart from its somewhat stunted form, the delicacy of its markings and rows of gem-like granules, it is remarkable for the double angle at the top of the body-whorl.

CONUS REFLECTUS, sp. nov. (Plate LXXV. fig. 6.)

C. *testa pyriformi, antice granulala, postice lævi, ad angulum minutissime coronata, albida, roseo late bifasciata, fasciis fusco nebulatis; spira modica, anfractibus concaviusculis crebre sulcatis; apice acuminato.*

Long. 25, lat. 15 mill.

Shell pear-shaped, anterior portion granulated, otherwise smooth, very minutely coronated at the angle, whitish, with two broad bands of rose-colour clouded with brown; spire moderate, whorls rather concave, closely grooved; apex acuminated. Specimen in the collection of Dr. Prevost.

LIMA ZEALANDICA, sp. nov. (Plate LXXV. fig. 1 *a*, fig. 1 *b*.)

L. *testa lata, crassa, subinflata, radiatim costata, utrinque paululum hiante; latere antico oblique producto, late concavo-planulato, infra medium angulato, margine ventrali ad angulum acclivi; latere postico oblique rotundato; costis* 18, *regularibus, quadratim rotundatis, crassis, squamatis, interdum fulvo-rubescentibus; interstitiis lævibus, concavis, costas æquantibus; auriculis parvis declivibus; umbonibus acutis incurvatis.*

Shell broad, thick, rather inflated, radiately ribbed, slightly gaping on each side; front side obliquely produced and concavely flattened, forming an oblong lunule terminating below the middle in a decided angle; the other side obliquely rounded; ribs eighteen in number, rather square, thick, scaled, sometimes of a reddish-brown colour; interstices between the ribs smooth, concave, equal in width to the ribs; auricles small, sloping; umbones acute, incurved.

Hab. New Zealand.

This species is well distinguished from its congeners by a broad concave lunule, forming a straight outline to one side of the shell, terminating in an abrupt angle. Among recent species its nearest analogues are *L. paucicostata* (Sowerby) from the Red Sea, and *L. multicostata* (Sowerby) from Australia; but it differs from both these in the characters above mentioned, and in the number of ribs being more than those of the former and less than those of the latter; the ribs also are more elevated than either. There is a fossil species found in the Pliocene of New Zealand to which this is more nearly allied; but, upon comparison, I am convinced that it is distinct. All the species of *Lima* hitherto known being entirely white (with the exception of *L. fasciata*, which has very faint fulvous concentric bands), receiving first the coloured specimen of the new species I thought the colour might prove specific; but I have since received a larger specimen in which there is no trace of colour; so that the coloured specimen must be regarded as a variety. Both specimens belong to the collection of Dr. Prevost.

Cardium ornatum, sp. nov. (Plate LXXV. fig. 2.)

C. *testa oblique orbiculari, mediocriter inflata, radiatim costata, latere antico rotundato, postico superne leviter compresso, obtusissime angulato; costis 28, elevatis, angulatis, conspicue nodosis, maculis rubris paucis pulcherrime ornatis, ad latera oblique sulcatis.*

Long. 19, lat. 17 mill.

Hab. Hongkong.

Shell obliquely orbicular, moderately inflated, radiately ribbed, front side rounded, posterior slightly compressed, and very obtusely angled at the upper part; ribs twenty-eight in number, elevated, angulated, conspicuously noduled, and ornamented with distant red spots; sides of the ribs obliquely grooved.

Several specimens of this pretty little species were sent me last year from Hongkong by Mr. Cuthill, the type having passed into the collection of Dr. Prevost.

EXPLANATION OF PLATE LXXV.

Fig. 1 *a* and *b*. *Lima zealandica* and var., p. 754.
2. *Cardium ornatum*, p. 755.
3. *Conus paulucciæ*, p. 752.
4. —— *superscriptus*, p. 753.
5. —— *baccatus*, p. 753.
6. —— *reflectus*, p. 754.

2. On two new Species of *Hesperomys*.

By Edward R. Alston, F.L.S., F.Z.S., &c.

[Received November 1, 1876.]

In examining the Central-American specimens of Muridæ in the British Museum I have found two well-marked species which appear to be undescribed.

Of these, the first was indicated, though not characterized, by the late Dr. Gray, and was exhibited to this Society, along with some other Guatemalan mammals, in June 1843. I have thought it best to retain his name, and would therefore call it:—

Hesperomys teguina, sp. n.

Mus teguina, Gray, P. Z. S. 1843, p. 79 (sine descr.).

Ears moderate, rounded, sparingly clad with fine blackish hairs. Tail short, not longer than the body alone, very minutely annulated and rather thickly covered with fine short dark-brown hairs. Fur close and velvety. Colour of all the upper parts warm dark reddish brown, the fur lead-coloured, with red-brown tips, the longer hairs on the back black; chin, throat, and breast like the upper parts, but more greyish, the rufous tips of the hairs being shorter; belly shaded into deep fawn; ears, feet, and tail dusky. Approximate measurements of the mounted type specimen:—

	inches.
Length of head and body	3·25
,, tail (tip imperfect)	1·90
,, ear	0·40
,, hind foot	0·65

Hab. Coban, Guatemala (*Brit. Mus.*).

This very peculiar small dark short-tailed mouse is quite unlike any other species with which I am acquainted. It may here be observed that the *Mus tazamaca*, indicated as new by Gray at the same time, proves to be the species since named *Reithrodon mexicana* by M. de Saussure*.

The second species is a large form, which I propose to name after Dr. Elliott Coues, whose recent researches have done so much towards clearing up the confusion existing as to North-American rodents.

HESPEROMYS COUESI, sp. n.

Ears proportionally small, rounded, sparingly clothed with short hairs. Fore feet small; hind feet large, the toes long, the second, third, and fourth being subequal, the soles quite naked, with small tubercles arranged as in *H. palustris*. Tail long, scaly, almost naked, the fine sparse hairs being hardly perceptible. Fur thick and rather woolly. Upper parts reddish brown, the fur dark slate-colour, with broad rufous tips, mixed with longer black hairs; the flanks lighter rufous, gradually shading below into dirty white (or pale fawn) without any distinct line of demarcation; breast washed with rufous; feet very sparsely clad with short greyish hairs; tail nearly unicolorous, paler beneath at the base. Teeth typically Hesperomine; skull with the upper margin of the orbits forming a raised crest (as in *H. palustris*), but the palate not produced so far back. Measurements of three specimens, *a* in spirits, *b* in skin, *c* mounted:—

	a. inches.	*b.* inches.	*c.* inches.
Length of head and body	5	6·75	—
,, tail	5·70	6·00	5·40
,, ear	0·54	0·55	
,, fore foot	0·48	0·55	
,, hind foot	1·10	1·30	1·08
,, skull............	..	1·25	

Hab. "Mexico," (*b*) *Geale*, (*c*) *Verreaux*, Brit. Mus.; Guatemala (~~c~~); Coban, (*a*) *Salvin*, Brit. Mus. a/

The Guatemalan specimen differs from the Mexican ones in being light fawn beneath, instead of dirty white more or less washed with rufous, but agrees in all other respects.

This species resembles *H. palustris*, Harl., in the raised supraorbital ridges of its skull, its short ears, large hind feet, and naked

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* Rev. et Mag. de Zool. 1860, p. 109.

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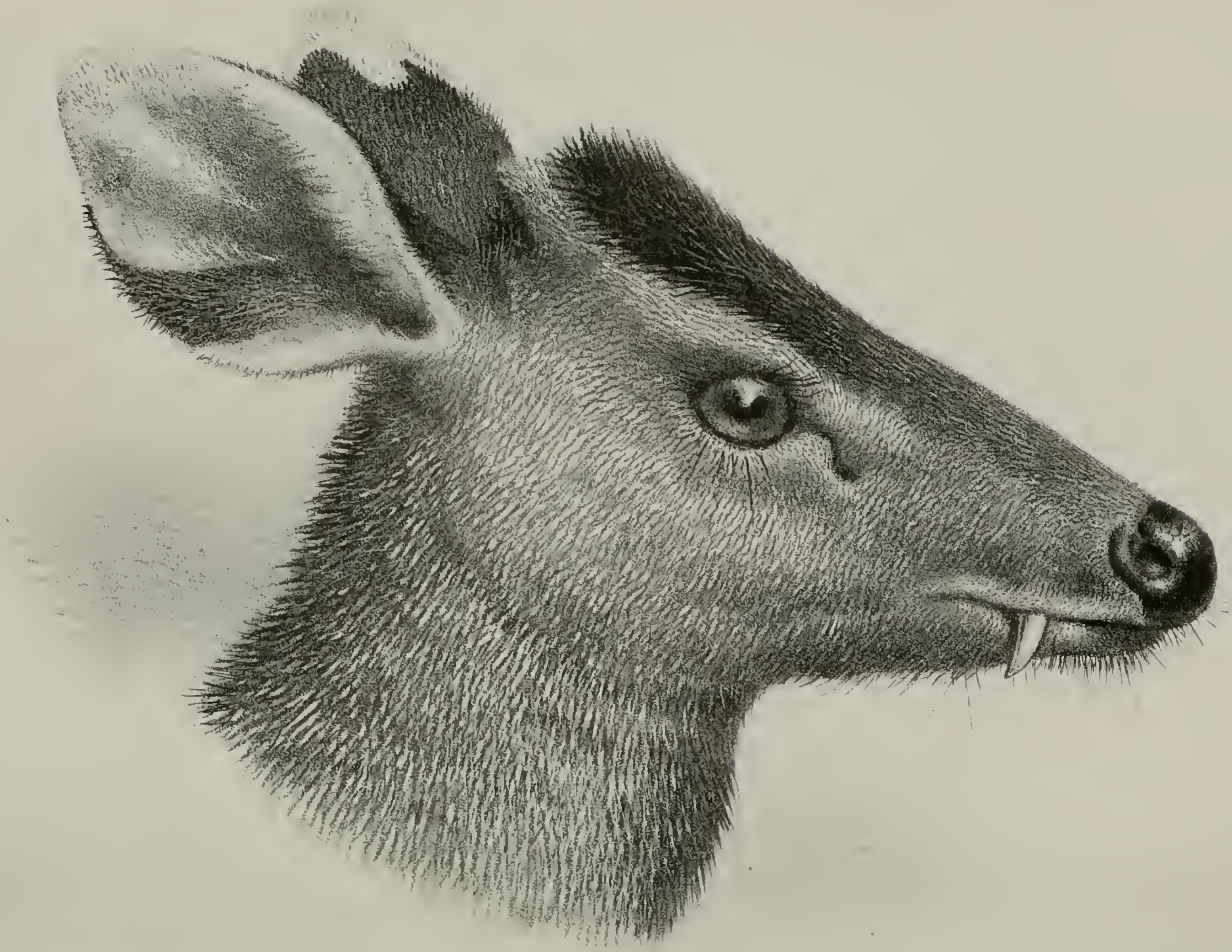

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M & N Hanhart imp

HEAD OF LOPHOTRAGUS MICHIANUS, ♂ *juv.*

soles—points which have caused Drs. Baird[*] and Coues[†] to separate that species as a subgenus *Oryzomys*. It differs strikingly, however, not only in size and coloration, but in the long and nearly naked tail. In the latter it rather agrees with the forms named *H.* (*Tylomys*) *nudicaudus* by Dr. Peters[‡] and *Neomys panamensis* by Gray[§]; but these have a different type of skull, the supraorbital edges being produced laterally instead of vertically. From the character of the feet, I should expect that *H. couesi* would prove to be at least partially aquatic in its habits.

3. On the Chinese Deer named *Lophotragus michianus* by Mr. Swinhoe. By A. H. Garrod, M.A., F.R.S., Prosector to the Society.

[Received November 7, 1876.]

(Plate LXXVI.)

At a meeting of this Society in 1874 (P. Z. S. 1874, p. 453), Mr. R. Swinhoe described a small Deer sent him from the neighbourhood of Ningpo by Mr. Michie, of Shanghai, and gave it the name *Lophotragus michianus*, after its discoverer. The specimen consisted of a skin, without the skull or any other bones. Mr. Sclater, at the time, suggested that it might be the *Elaphodus cephalophus*, which had been described shortly before[||] by M. Alphonse Milne-Edwards from specimens obtained by Père David in Moupin. Mr. Michie informed Mr. Swinhoe that the specimen was a female; and Dr. Peters, of Berlin, who carefully examined it before it was mounted for the national collection in that city, has courteously answered questions which I put to him with reference to it (the type) in the following words:—"It does not show a trace of horns. . . . It shows *well-developed* teats, and not a trace of a penis; there is no trace of an impression on the lower lip, as would have been the case if it had been furnished with the male tusks, figured from imagination in Swinhoe's figure." From what will be said further on it can be evidently inferred that the type specimen is a female.

A second specimen, a living male, of the same Deer was purchased by the Society on February 12th last from Mr. Michie's agent. It also came from the Ningpo district. Mr. Sclater's note with reference to it, together with a woodcut of the animal, will be found in the 'Proceedings' for this year (*anteà*, p. 273). In this he tells us that "the canines project from the sides of the mouth, as in *Hydropotes*. There are no external antlers; but there are hard projecting cores, sensible to the touch, beneath the elongated hairs which form a flattened disk on the forehead."

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[*] Mamm. N. Amer. p. 458.

[†] Proc. Acad. Philad. 1874, p. 183

[‡] Monatsb. Ak. Berlin, 1866, p. 404.

[§] Ann. & Mag. Nat. Hist. 4th ser. xii. p. 417.

[||] Nouv. Arch. du Mus. 1874, Bull. p. 93.

Shortly after its arrival the animal began to show symptoms of paralysis, which led to its death on the 14th of July. The following are measurements made a few hours after its death, before any incisions had been made :—

	inches.
From tip of nose to base of tail........ ..	36
Fleshy tail...........................	3
Length of head.......................	9½
Length of ear..........................	5½
Greatest breadth of ear................	3½
From the middle line of the back straight down to the elbow.....................	10
From the elbow to the wrist............	5½
From the wrist to the base of hoofs......	6½
From the middle line of back straight down to the knee.........................	11¼
From the knee to the ankle............	9
From the ankle to the base of the hoof ..	10

A minute examination of the skull and skin of this specimen, in association with the description and figures given of *Elaphodus cephalophus*, made it quite evident to me that Michie's Deer is of the same genus as it; and I wrote to M. Milne-Edwards to ask him some questions of detail with reference to the Moupin species. In reply that gentleman told me that, besides the specimen figured by him, he has two other skins of the same species in very bad condition, which much resemble *Lophotragus* in their colour, and that he believes they clearly show that the species is variable in its coloration, and that the Deer described by Mr. Swinhoe is the same as that obtained by Père David. At the same time he very courteously sent me the two skins above mentioned, from the larger (male) of which the figure of the skull given by him was taken, and also gave me permission to remove the skull from the smaller (young female) skin. This I have done, and find that in age it is exactly the same as the Society's specimen.

A comparison of the skins makes it immediately evident that the animals from Moupin and those from Ningpo scarcely differ from one another at all, and that *Lophotragus michianus* and *Elaphodus cephalophus* are the same species, slightly modified in accordance with the difference in their habitats.

The following description of the species may serve to render its characteristics more apparent :—

Elaphodus cephalophus is a Deer of about the same size as the Indian Muntjac (*Cervulus muntjac*), with minute simple antlers, which are situated on slender convergent pedestals; and with enormous canine teeth. The supraorbital glands, found in the Muntjacs, are not present; nor is there a tufted gland on the outside of the metatarsus.

The hair is coarse and slightly quill-like. In the Moupin specimens it is of two kinds as regards general coloration—all in front of a vertical line drawn through the shoulder-joint, with the exceptions to be mentioned below, being whitish at the base, and gradually becoming dark-brown towards the tip, quite close to which there is a distinctly marked narrow *white* ring. This white ring near the extremity of each hair gives a speckled appearance to the parts covered with it.

Over all the body behind the above-mentioned line this white ring is absent; and each hair, from being white at the root, gradually darkens to become of a rich brown at the tip, over the sides and back of the animal, more pronounced along the middle line—at the same time that, whilst deepening in intensity down the legs, below the carpus and tarsus the colour is almost black itself, as are the hoofs. In the female figured by M. Milne-Edwards, which is of a more rufous tint generally than the pair of skins lent by him to me, there is, as is sometimes the case in *Cervulus reevesi*, a white line just above the hoofs.

The under surface of the tail is white, as is also the hair in the pudendal region.

Much resembling, though more developed than in the females and the young males of the genus *Cervulus*, there is a crest of lengthy deep-brown, almost black hair arranged in a horse-shoe shape in the frontal region. It is anteriorly that the crest is deficient, the short speckled hair of the nose extending backwards, at the same time that it lengthens, to enter the interior of the enclosure thus formed. This crest is slightly prolonged between the ears as a pointed process, with the equally dark hair of the base of the exterior of which it does not blend, a narrow speckled isthmus intervening. M. Milne-Edwards tells us* that the interior of the ears is whitish, and that the tips of these organs, as well as the greater part of their inner edge, are of a nearly pure white. A transverse black bar extends across the inner surface of the ear, about three quarters of an inch broad. Along the lateral margin of the outside of the horse-shoe crest the short hair forms a light grey line in front of the eye, becoming reddish brown behind it. The long hair of the crest itself is directed backwards.

In the young male specimen from the hills near Ningpo which forms the subject of the present paper, the only hair which is ringed is situated in the front of the base of each ear, occupying an extremely small area. Elsewhere the chocolate-brown of the Moupin examples is replaced by greyish-black, each hair being white for a considerable distance from its base. The face and neck are therefore not speckled or brown, but uniformly dark grey. The head is figured, as it appeared immediately after death, in the accompanying drawing (Plate LXXVI.).

The *skull* of the Ningpo *Elaphodus* cannot be said to differ essentially from the Moupin specimens. Although there are exquisite figures in the 'Recherches pour servir à l'histoire Naturelle des Mammifères'† of the skull of the adult male, M. Milne-Edwards has most obligingly allowed me to remove the cranium from the skin of the female that he has lent me, which fortunately happens to be of exactly the same age as the Society's male; in other words, the median milk-incisors are gone, whilst the third molars are just protruding, all the milk-molars being in place. In the Society's specimen the frontal pedestals are fairly long, but without any antlers at their extremities. Their bases are slightly further from one another than in the Moupin male; and there is a second slight difference from both it and the female, which is, that just at the root of the ascending orbital process of the malar bone the ring of the orbit does not become ossified upwards so as to reduce its size by the formation of a shallow lamina above the masseteric ridge. This peculiarity may also be expressed by saying that the surface of origin of the masseter muscle extends upwards as far as the margin of the orbit in the Ningpo male, whilst in those from the more western locality it ceases some distance below it. But it must be noted that the Ningpo specimen died in very bad condition, the bones being spongy and ill-marked*, whilst the others were shot wild. In it, strangely enough, there is also an abnormality with which I am not at all acquainted. It is that the malar bones on both sides, instead of being single, are made up of two independent parts, an orbital and a zygomatic, with the suture longitudinal and nearly straight, extending from the anterior extremity of the zygomatic process of the temporal bone to the posterior inferior part of the large crumenal depression.

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* *Loc. cit.* p. 355.

† Atlas. pls. 66 & 67.

Sir Victor Brooke†, in his paper on the *Cervuli*, has drawn attention to the very peculiar distribution of the ankyloses in the tarsus of that family, he having demonstrated that in it the external and middle cuneiform bones blend with the naviculo-cuboid to form a single bone. The same condition exactly exists in *Elaphodus cephalophus*, the innermost cuneiform bone remaining free. But, strange to relate, in my specimen of Michie's Deer, on both sides, this internal cuneiform bone is completely anchylosed with the metatarsus, a further specialization than is found in any other ruminant, so far as I can make out.

In Michie's Deer no trace of the lateral metacarpal rudiments could be detected. It possesses thirteen pairs of ribs, six lumbar vertebræ, six ankylosed sacrals, and nine caudals, making forty-one

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* The following are the measurements of the skull of the Ningpo male, side by side with which those of the male (adult) Moupin specimen are given, from M. Milne-Edwards's figure:—

	Ningpo spec. in.	Moupin spec. in.
Extreme length of skull	$6\frac{3}{4}$	$7\frac{15}{16}$
Extreme breadth from zygoma to zygoma..	$3\frac{1}{32}$	$3\frac{7}{16}$
Interval between inner sides of frontal pedestals ...	$1\frac{13}{32}$	$1\frac{1}{8}$
Extreme length of nasal bones..........................	$2\frac{3}{16}$	$2\frac{1}{2}$
Breadth of facial plane opposite lacrymal foramina	$1\frac{21}{32}$	$2\frac{1}{32}$
Mandible from angle to incisor margin	$5\frac{1}{2}$	$6\frac{1}{2}$
Extreme length of præmaxilla..........................	$1\frac{23}{32}$	$2\frac{5}{32}$
Extreme intermolar breadth	$1\frac{1}{4}$	

† P. Z. S. 1874, p. 33.

vertebræ in all. The bones, in the specimen under consideration, especially those of the limbs, are extremely porous and badly marked; nevertheless, on making a section of the head of the metatarsus, it is apparent that the internal tarsal cuneiform bone has so completely fused with it as to leave no line of demarcation. In the Paris specimens of *Elaphodus* the tarsus exactly resembles that of *Cervulus*, and the lateral metacarpals are very nearly lost.

In the young female from Moupin the milk canine teeth are in place, their permanent successors appearing, in the dry skull, above them. In the male of the same age from Ningpo, the tusks have a remarkably permanent appearance, and there is no evidence from the condition of the maxillary bones that they belong to the milk series. Such being the case, it must be presumed that the milk canines in the male are shed earlier than in the females, as it is not in accordance with any known facts that they should have persistent pulps which would remove any necessity for their replacement.

Anatomy of the Alimentary Canal and other Viscera.

The muffle is more considerable than in the Elaphine Deer, but resembles that of the *Rusinæ* and Muntjacs in extending upwards along the outer border of each nostril as far as its superior margin. The canine tusks protrude an inch below the upper lip, and mark the lower lip at the spots at which they come into contact with them.

The *palate* in front of the intermolar region is transversely ridged by folds of the mucous membrane, slightly crenulated at their free backwardly directed edges. These folds are deficient in the middle line; and those on one side are not continuous with those of the other, but with the spaces which intervene between them. The intermolar region and the palatal surface behind it are smooth, and black instead of flesh-coloured, as it is anteriorly.

The *tongue* is like that in most ruminating animals, broad near the tip, then narrower, and again slightly broader opposite the intermolar eminence. Its mucous membrane is covered with two kinds of papillæ—first the filiform, small, thick-set, short and blunt over the anterior part of the organ, conical and larger in the middle of the intermolar eminence, and secondly the fungiform, disk-shaped and flattened, scattered sparsely over the fore part, and at the sides of the intermolar eminence gradually enlarging and becoming arranged in a linear manner, converging as they run back to form the circumvallate papillæ, eleven on one side and twelve on the other.

The salivary glands present no special features of interest. The tonsils open each by an orifice situated in the middle of a slight depression. The epiglottis is rounded, with a slight notch in the middle line of its contour.

The *stomach* possesses much the proportions of that of the Musk (*Moschus moschiferus*)*. In the *rumen* perhaps the converging left lateral cæcal extensions of the upper and lower compartments are slightly longer. The villi are there very close-set, elongated, flattened, and slender, with nearly parallel sides, the largest being slightly spooned at their free ends. In most parts they are about a quarter of an inch long; but on the folds they are much shorter. Nowhere are they absent. They are all blunt-tipped and slightly crenulated along their margins. No trace of the special gland found by Prof. Flower on the anterior wall of the paunch of the Musk could be detected. Neither in *Cervulus muntjac* nor in *C. reevesi* are the villi of the rumen flattened, they being cylindrical. The cells of the *reticulum* are shallow and not large, covered with minute papillæ on their floors, and with a regularly arranged row on the top of each cell-wall.

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* *Vide* P. Z. S. 1875, p. 168.

The *psalterium* resembles that of the ordinary Deer, and differs from that of *Moschus* in that the plicæ are unequal in length. There are thirteen folds of what may be termed the first power, because they are the deepest, between each two of which one of the second power is developed. On each side of each secondary fold is a tertiary, about a quarter of an inch deep; and, again, there is a longitudinal row of papillæ on each side of each tertiary fold, which may be considered to be a rudimentary set of the fourth power. Such a psalterium may be called *quadruplicate*, because folds are present of four different depths. The stomach of *Moschus* would be simpliciplicate, were it not that there is a row of papillæ developed between the plicæ in some parts; it is therefore duplicate upon the nomenclature here suggested.

The *abomasum* presents no peculiarities.

The following are the measurements of the intestines:—

	ft.	in.
Small intestine	23	2
Large intestine	9	8
Cæcum		9¼

The colic coil was not disposed in quite the ordinary manner; but the peculiarity was probably an individual one. At its end the large intestine made a complete transverse reduplication before turning forward from the right iliac fossa to form its terminal and irregular curve round to the sigmoid flexure.

The *spleen* is flat on one side, domed on the other, and circular.

The *liver* is composed of two nearly equal lobes, from the abdominal surface of the right of which is developed the triangular and laterally directed caudal lobe. The Spigelian lobe is only rudimentary, being represented by a slight tumefaction of the vertebral border of the portal fissure. There is no gall-bladder.

In the arteries of the neck the arrangement is that found in the Ruminantia generally, the ascending aorta giving origin, first to the left brachial with the corresponding vertebral, then to the left carotid, and finally to the same three vessels of the right side.

There are thirty-eight tracheal rings above the accessory bronchus, and nine below it, making forty-seven in all. In the lungs the two lobes of the left side and the five on the right were found, the right lung being the larger. The lower lobe of each lung is comparatively small.

The *brain* (figs. 1 and 2) is richly convoluted for its size, its measurements, after having been hardened in spirit, being:—

	in.
Greatest length of hemispheres	$2\frac{19}{32}$
Greatest depth of hemispheres	$1\frac{1}{2}$
Greatest breadth of brain	$2\frac{3}{16}$

It is therefore somewhat larger than in *Cervus humilis*, as may be inferred from the measurements given by Professor Flower*. This species it also closely resembles in its convolutions, as well as in the considerable development of the anterior lobes. The hippocampal, inferior external, together with superior and middle external gyri, are easily recognizable, the sulcus separating the last two being long, and the middle external gyrus traversed in the direction of its length by

Fig. 1.

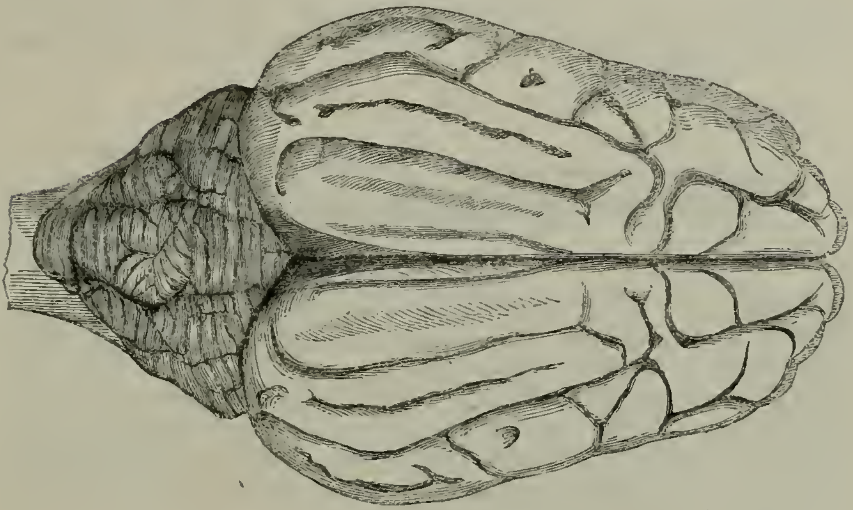
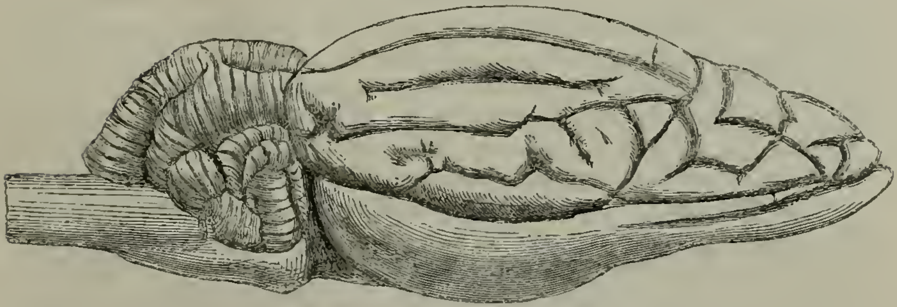


Fig. 2.



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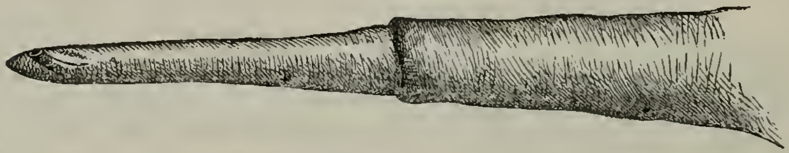
* P. Z. S. 1875, p. 176, note.

a minor sulcus. There is a break in the sulcus which separates the middle and inferior external gyri a little more than an inch from the anterior border of the hemisphere, which is peculiar. As in *Moschus* and in *Cervus humilis*, the calloso-marginal sulcus appears on the superior surface of the brain, allowing the hippocampal gyrus to appear between it and the middle line. In *Cervulus muntjac* the convolutions are slightly less developed than in Michie's Deer, and the calloso-marginal sulcus is even more superficial; it is, however, narrower anteriorly.

In its *generative organs*, the glans penis (fig. 3), instead of being blunt, is an elongated and slender cone, terminating much like the tip of a wooden pen-holder, the urethral orifice being situated just behind the extreme tip, slightly turned upwards. The Muntjacs and the Roe Deer agree with Michie's Deer in the shape of the glans; but whereas there is no trace of Cowper's glands in *Capreolus* and Michie's Deer, they are large in *Cervulus* (in *C. muntjac* at least). There are four nipples. On the outside of the skin covering the metatarsus I found in the recently dead animal a deep smegma-secreting depression, evidently homologous with the metatarsal glands in most Cervidæ. There were no tufts of hair round these; and I cannot recognize their situation in the prepared specimen of the skin.

Fig. 3.



General Remarks.

From what has been said above, it is evident that the *Lophotragus michianus* of Swinhoe is the same animal as the earlier-named *Elaphodus cephalophus* of A. Milne-Edwards, and that it was because his specimen was a female in which the skull was wanting, at the same time that the figure given by M. Milne-Edwards is from a remarkably light-coloured and red skin, that Mr. Swinhoe was misled as to its affinities. It seems, however, that the Ningpo animal is of a greyer tint than that from Moupin; for the description given by Mr. Michie*, namely that "it is a dark iron-grey or pepper-and-salt colour, like some Scotch terriers," exactly applies to the Society's example, whilst the Paris skins are all decidedly chocolate, although differing in tint among themselves.

As to the affinities of *Elaphodus cephalophus*, M. Milne-Edwards† has remarked that "it is intermediate between the Muntjacs and the ordinary Deer, in certain respects appearing even to unite these animals to *Hydropotes* and *Moschus*."

That *Moschus* has any close affinities with *Cervulus* and its allies is extremely doubtful; and a comparison of the above description of

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* P. Z. S. 1874, p. 453.

† *Loc. cit.* p. 353.

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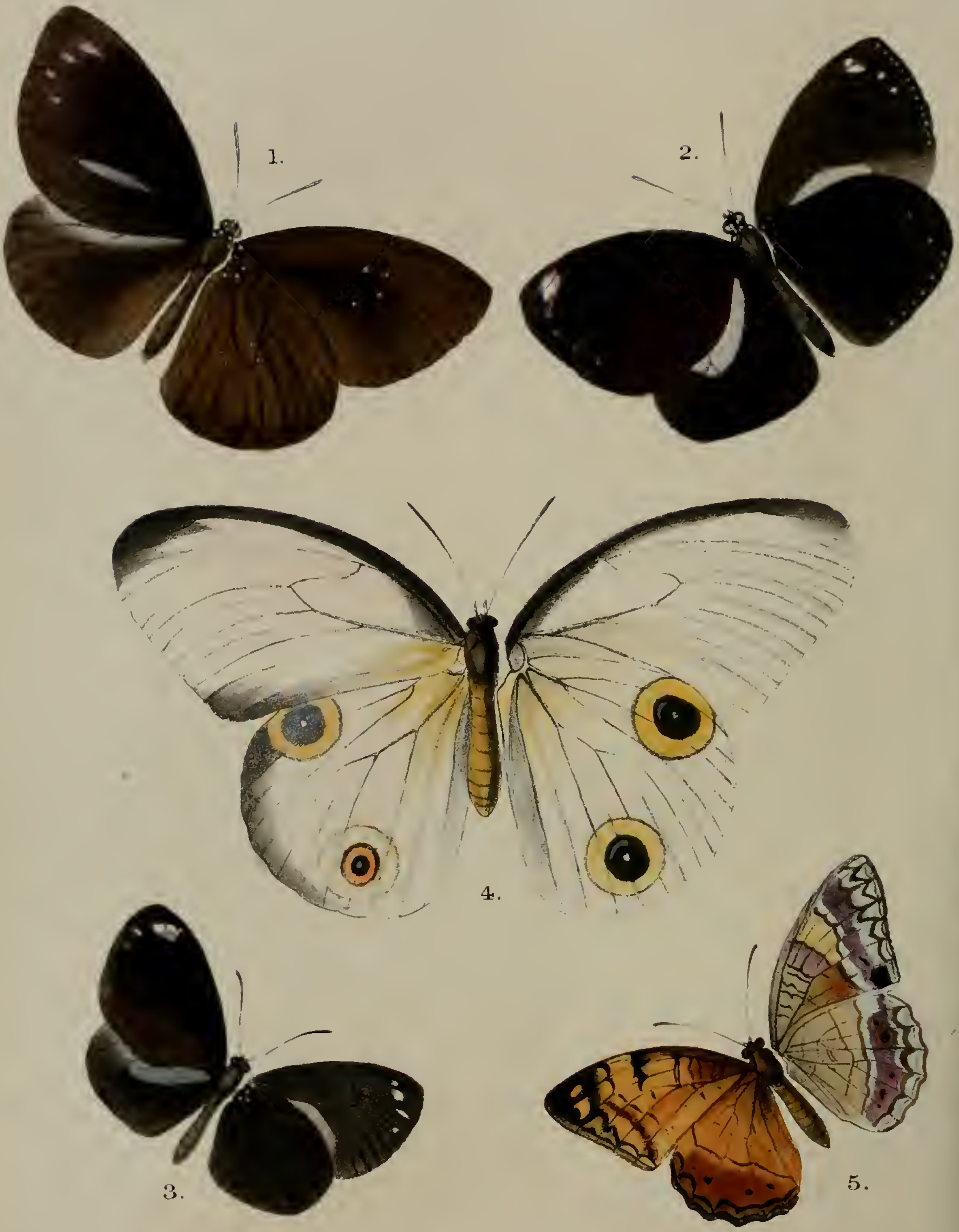

E. A. Smith del et lith.

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BUTTERFLIES FROM NEW GUINEA.

the visceral anatomy of *Elaphodus* with the facts brought forward in Prof. Flower's important memoir on *Moschus* tends to confirm this view.

The internal anatomy of *Hydropotes* is not known; but the absence of any frontal tuft, the presence of an inflated auditory bulla, together with the non-ankylosis of the cuneiform bones with the naviculo-cuboid of the tarsus, are against its Cervuline affinities.

With *Cervulus* there is every reason to believe that *Elaphodus* is most intimately related. The size of the animal, the conformation of the skull, the fusion of the cuneiform bones with the naviculo-cuboid, the non-development of the metatarsal tufts, and the presence of the frontal crest are all evidences in that direction, as is the similarity of the shape of the glans penis in the two genera. It appears to me that *Cervulus*, together with *Elaphodus*, form a subfamily of the Cervidæ, which might be termed the Cervulinæ and be defined as follows:—

CERVULINÆ. Small Cervidæ in which the proportionally small antlers are situated on elongated pedestals, up the front of which the lengthy hair of the crest which is developed in the frontal region extends. Females hornless. Suborbital glands large in both sexes. No metatarsal tufts. Canine tusks large in the males, minute in the females. The second and third cuneiform bones of the tarsus ankylosed with the naviculo-cuboid. The lateral metatarsals wanting, and the lateral metacarpals present only as slender bones opposite the upper ends of the third and fourth metacarpals, or wanting altogether.

Two genera are contained in this subfamily.

Cervulus. Cervulinæ in which the pedestals of the antlers are divergent, and send downwards from their roots strong supraorbital ridges, the antlers themselves diverging into a brow-antler and a simple beam. Cutaneous glands developed on the inner side of each supraorbital ridge.

Elaphodus. Cervulinæ in which the pedestals of the antlers are convergent and do not send downwards supraorbital ridges. Antlers minute and simple, scarcely projecting beyond the much-developed frontal hair-tuft. Frontal glands absent.

4. Descriptions of new Species of Lepidoptera from New Guinea, with notice of a new Genus. By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Received November 4, 1876.]

(Plate LXXVII.)

The following novelties formed part of a collection recently made in Yule Island, New Guinea, by Dr. James.

RHOPALOCERA.

NYMPHALIDÆ.

EUPLŒA GUERINII, Felder.

I merely record this butterfly as being common in the collection, and only previously known to occur at Aru; until now I had not seen the species.

EUPLŒA DOLOSA, n. sp. (Plate LXXVII. fig. 1.)

Allied to the preceding, smaller, no white spots.

Wings above dark pitchy brown, paler on the external area and costal area of secondaries; primaries with six to seven lilac subapical spots in a curved series, the third in the male (which is fourth in the female) largest and sagittate; male with an elongate interno-median sericeous streak; female with the subapical spots larger and paler than in the male. Wings below bronzy olive-brown; central area of primaries blackish, internal area greyish, with a sericeous streak in the male and a white streak in the female; a minute bluish dot in the cell and three beyond it (sometimes wanting): secondaries with a dot in the cell, and sometimes one beyond it pale bluish; base of wings and pectus black, white-spotted. Expanse of wings, ♂ 3 inches 1 line, ♀ 2 inches 9 lines.

CALLIPLŒA JAMESI, n. sp. (Plate LXXVII. fig. 2.)

Allied to *C. pumila*, but the male darker than *C. trimenii* or *C. seriata*.

♂. Wings above deep shining red-brown, the external half of primaries and the apical border of secondaries almost black, with faint purplish reflections; primaries with two subapical contiguous white spots, and below them a decreasing submarginal series of four white spots, all bordered with lavender; secondaries with costal area shining silver-grey, the cell and the area immediately above it occupied by a large creamy patch; a whitish subapical dot. Primaries below slightly paler; a large creamy internal patch reaching the median nervure; four pure white subapical spots in an oblique series, the two upper ones contiguous and largest; a submarginal series of minute white points: secondaries red-brown, apical area slightly darker; two subapical and four to five submarginal white points; base and pectus black, white-spotted. Expanse of wings 2 inches 8 lines.

♀. Paler and more uniformly coloured than the male, white spots much larger, bordered with lilac, subapical spot of primaries trifid, five submarginal spots; three subapical white dots in secondaries: wings below paler, all the spots of the upper surface, and a complete submarginal series of spots white: expanse of wings 2 inches 8 lines.

A well-marked species.

CALLIPLŒA INFANTILIS, n. sp. (Plate LXXVII. fig. 3.)

♂. Allied to the preceding species, considerably smaller, darker, with fewer spots.

Primaries above deep coppery brown, the costal and apical half of primaries and the submedian area of secondaries almost black, with very feeble bluish reflection; primaries with a large trifid subapical white spot, washed with lilac; two submarginal white spots immediately below it: secondaries with the costal area shining brownish grey; the upper half of the cell and the area immediately above it sordid whitish. Wings below more uniform in colour than above; primaries with the interno-median area whitish; five subapical spots in an oblique series, the third largest: secondaries with two subapical bluish dots, the lower one barely visible; base of wings and pectus black, white-spotted. Expanse of wings 2 inches 2 lines.

The smallest species hitherto described.

TENARIS JAMESI, n. sp. (Plate LXXVII. fig. 4.)

Wings semihyaline, snow-white, with a diffused basal ochraceous nebula; primaries with the costal area and apex black-brown, external angle irrorated with sooty brown: secondaries with the apex and apical border sooty brown; a large subapical ocellus visible from transparency of the wing; a large ocellus on the first median interspace black, with white-dotted lilac pupil and diffused yellowish iris with greyish edge (round which is seen a pale ochraceous zone, owing to the transparency of the wing): head and collar black; antennæ black, palpi orange with black tip, thorax grey, the prothorax brownish; abdomen ochreous. Primaries below nearly as above, but without the sooty external angle; secondaries without the sooty apex and border, with two large ocelli, one subapical the other as above, black irrorated with blue scales, with large white pupils and broad grey-bordered ochreous irides. Pectus and legs black. Expanse of wings 4 inches 3 lines.

Allied to *T. mylœcha*.

ATELLA CERVINA, n. sp. (Plate LXXVII. fig. 5.)

Above reddish tawny, paler in the female, with blackish markings as in *A. arruana*, but more pronounced; wings below also much as in *A. arruana*, but the basal area not washed with lilac in either sex, the black spots more pronounced, the whitish discal and submarginal spots more silvery, and the submarginal zigzag ochreous band much more irregular: expanse of wings, ♂ and ♀, 2 inches 5 lines.

Though nearly allied to *T. arruana*, this species is much larger, darker, more heavily bordered and spotted with black-brown, and the basal area below differs markedly in the absence of the strong lilac wash which is persistent in the Aru species.

HETEROCERA.

CELERENA, Walker*.

Allied to *Celerena* (of Lepidoptera Heterocera); wings larger, more or less yellow in colour; the arrangement of nervures much the same; palpi thicker, antennæ much more slender. Type *C. divisa.*

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* Mr. Walker altered the type of his genus *Celerena*, originally described in the 'Transactions of the Entomological Society,' from *C. divisa* to *C. sobria*; as the two species are not congeneric, I would propose for the latter (which is the type of *Celerena* in the Lepidoptera Heterocera) the name of *Craspedosis*, n. gen.

CELERENA VULGARIS, n. sp.

Allied to *C. perithea*, of Cramer, from Amboina, but with the transverse golden-yellow band of primaries twice as wide, and the black-brown border of secondaries only half as wide: expanse of wings 2 inches 4 lines.

This is evidently a very common species.

The above-named genus will include the following species:—*C. lerne*, Boisd.; *C. divisa*, Walker; *C. andamana*, Felder; *C. commutata*, Walker; *C. mutata*, Walker; *C. perithea*, Cramer; *C. proxima*, *spreta*, and *connexa* of Walker; and *C. eucnemis* of Felder.

5. Contributions to a General History of the *Spongiadæ*. By J. S. BOWERBANK, LL.D., F.R.S., &c.—Part VIII.

[Received November 8, 1876.]

(Plates LXXVIII.–LXXXI.)

The Sponges described in the present contribution to a general history of the Spongiadæ are rare and very remarkable species. Three of them are, to the best of my knowledge, unique specimens; and the fourth, *Chalina verticillata*, elucidates in a singularly striking manner the structure and history of a diluvial fossil sponge enveloped in flint, which has for a long period been a mystery to palæontologists.

DESMACIDON PLUMOSA, sp. nov. (Plate LXXVIII.)

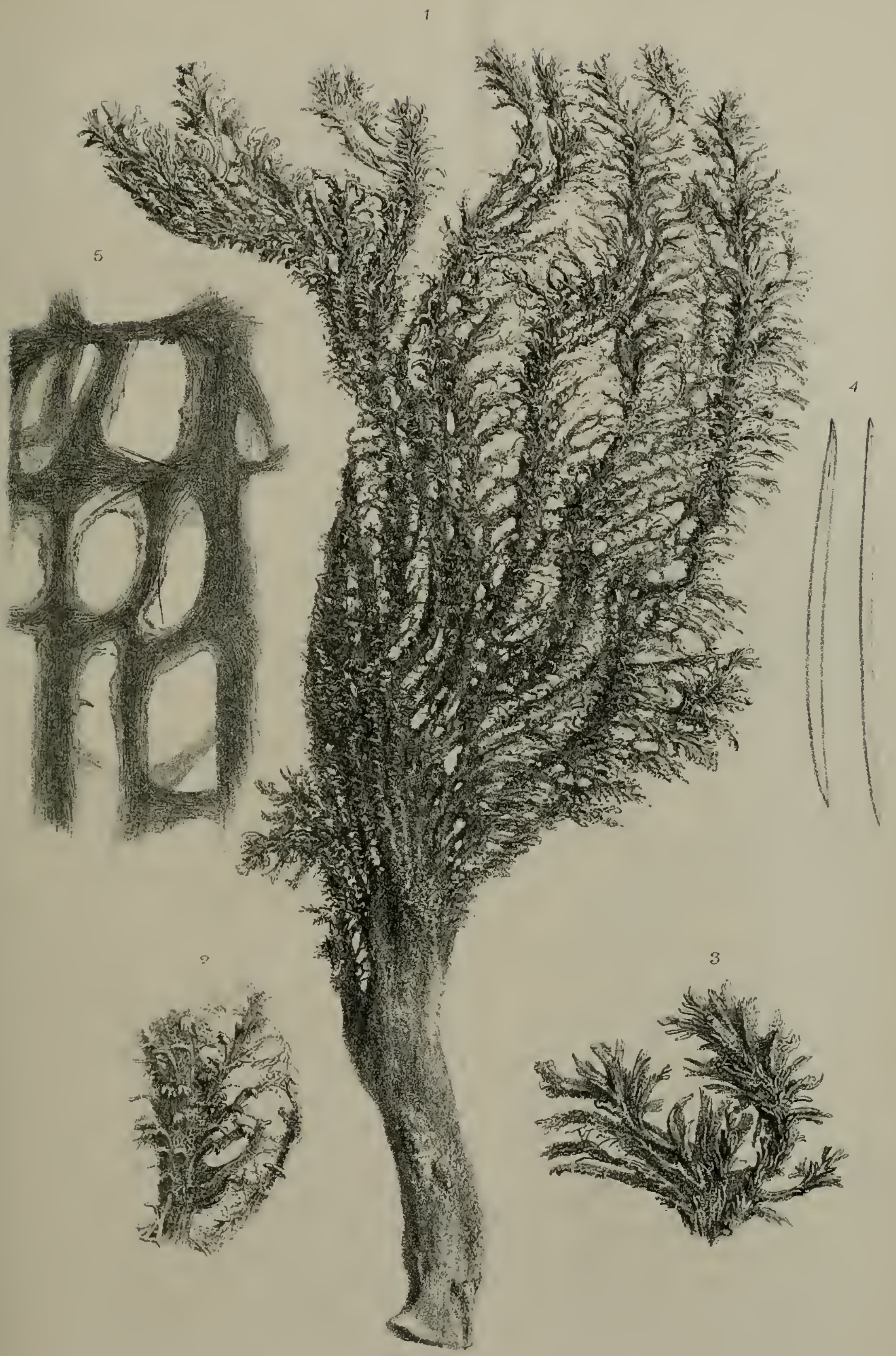
Sponge elongately fan-shaped, pedicellate; pedicle long and stout, smooth, fan-shaped, expansion prominently hispid on both planes. Oscula simple, dispersed, minute, and numerous. Pores inconspicuous. Dermal membrane aspiculous. Skeleton reticulated, rete irregular; primary fibres stout and solid, radiating irregularly from the discal end of the pedicle in the same plane; secondary fibres radiating from the primary ones at nearly right angles to the planes of the sponge, short, slender, and delicately plumous. Spicula subfusiform-acerate.

Colour, in the dried state, fawn-yellow.

Hab. Sharks' Bay, Western Australia.

Examined in the dried state.

I obtained this singular and interesting sponge among many others from a dealer in specimens of natural history, who stated that it was from Sharks' Bay, Western Australia. It is 15 inches in height, and about 5 inches broad at near the middle of the fan-shaped expansion. No portion of the basal attachment remains; and the pedicle in its present state slightly exceeds 4 inches in length. It is slightly



Dinkel del. et lith.

W. West & Co. imp.

Desmacidon plumosa.

BRITISH MUSEUM
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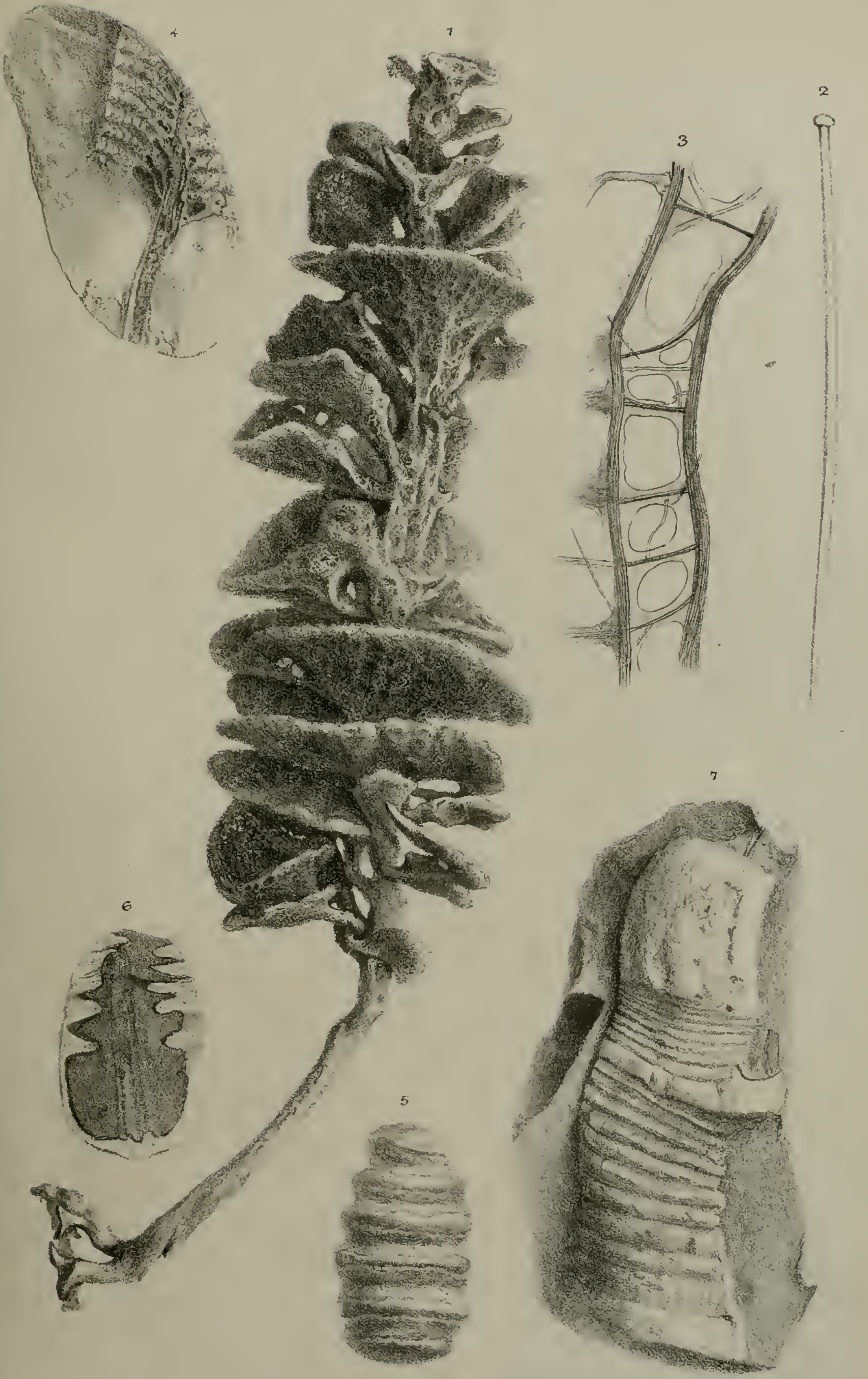
NATURAL HISTORY

P. Z. S. 1876. Pl. LXXIX.



Dinkel del. et lith.

W. West & Co imp.

Chalina verticillata.

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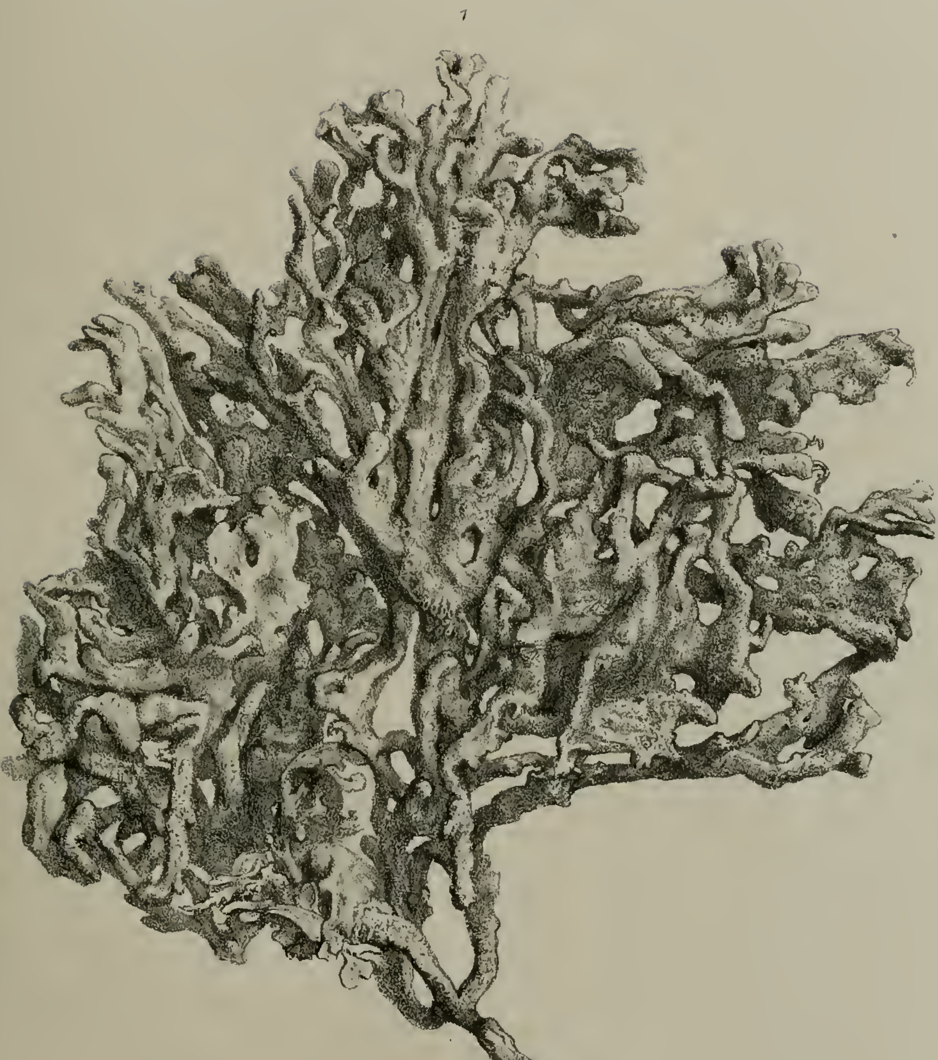

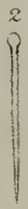

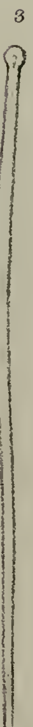

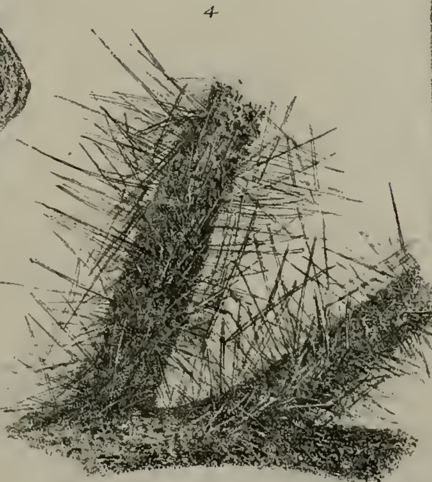

Dinkel del et lith.

W. West & Co. imp.

Ophlitospongia fucoidea.

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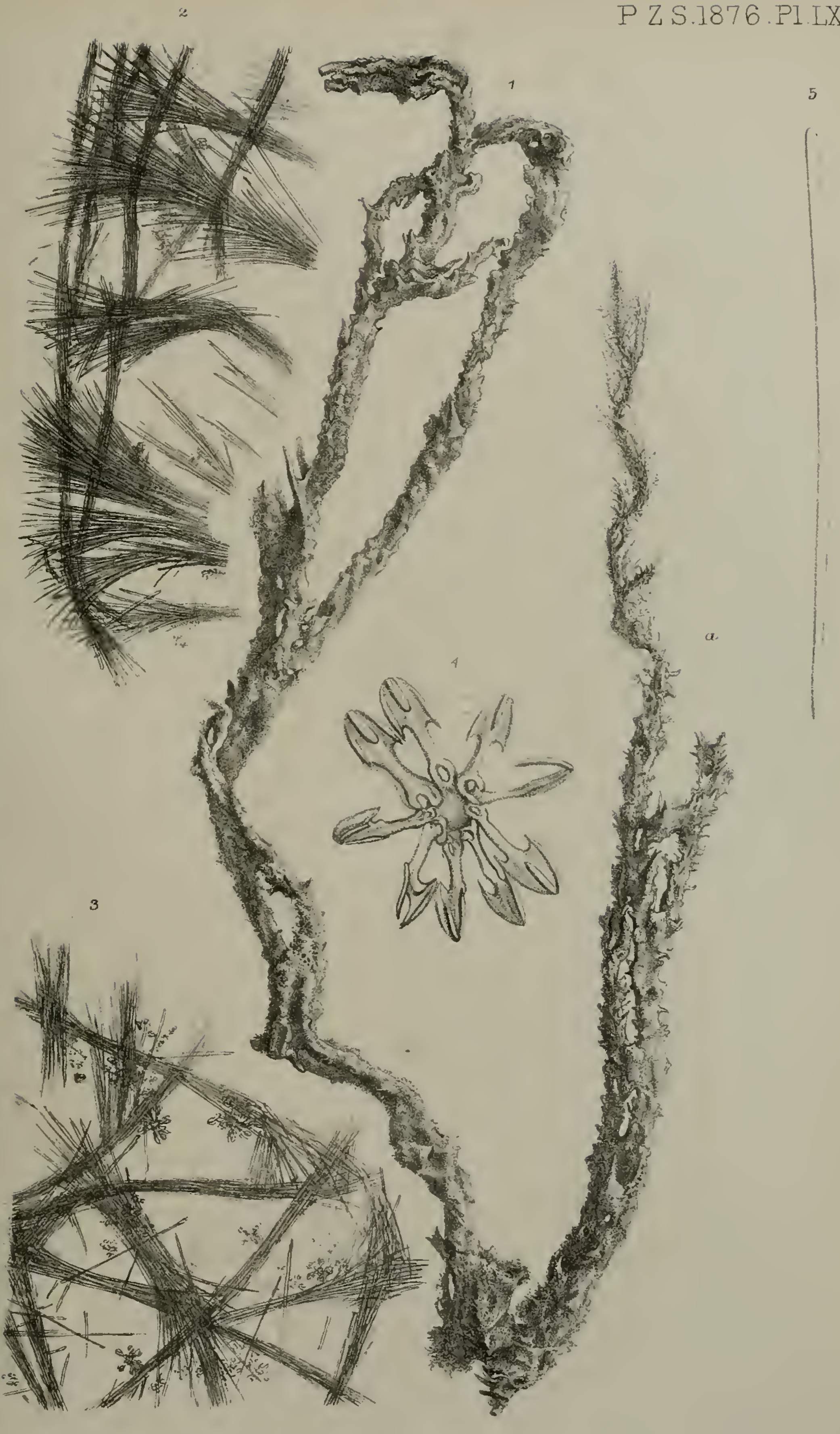
NATURAL HISTORY



Dinkel del et lith.

W West & Co imp.

Raphiodesma radiosa.

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compressed and very solid in its structure. The hispidity of the surfaces is produced by the projection of the secondary lines of the skeleton, which are uniform in length on both surfaces of the sponge; but they are more abundantly produced on the surface presented to the eye in the figure than on the opposite one; and they always terminate in plumous expansions. The primary lines of the skeleton are projected in slightly meandering lines, but always in the same plane; and none of them exceeds about a quarter of an inch in diameter. The oscula are abundantly dispersed on the primary lines of the skeleton; they are very minute, and are scarcely perceptible without the aid of a lens of about 2 inches focus. The dermal membrane is closely adherent to the spiculo-fibrous structures of the skeleton; and it can be seen distinctly only when small portions of the sponge are mounted in Canada balsam, in the form of thin expansions within the areas of the rete of skeleton-fibres. There is but one form of spiculum, the subfusiformi-acerate one; their average proportions are $\frac{1}{107}$ inch in length, and $\frac{1}{2608}$ inch in diameter. The general aspect of this sponge is very remarkable: all the secondary plumous fibres projected from either surface rise to nearly the same height, rarely exceeding that of about a quarter of an inch; and all of them assume the same plumous expansion of their apices. The skeleton-structure is purely that of a *Desmacidon*; but its peculiar mode of development differs widely from every other species of the genus with which I am acquainted.

CHALINA VERTICILLATA, sp. nov. (Plate LXXIX.)

Sponge pedicellate; pedicle long, smooth; proximal portion without sponge-plates; distal portion sustaining a succession of numerous thin perfoliate more or less circular cup-shaped plates of sponge, decreasing in size to the apex. Surface—upper and under surfaces of the plates rugose, margins entire. Oscula simple, dispersed, numerous on the under surfaces of the plates. Pores inconspicuous. Dermis reticular, rete irregular; dermal membrane sparingly spiculous; spicula depresso-spinulate, same size and form as those of the skeleton, dispersed. Skeleton symmetrical, radiating irregularly from the centres of the plates; primary and secondary lines slender and delicate, not very numerously spiculous; spicula depresso-spinulate, rather variable in length and diameter. Interstitial membranes sparingly spiculous; spicula same as those of the skeleton.

Colour, in the dried state, nut-brown.
Hab. Fremantle, Australia (*Geo. Clifton, Esq.*).
Examined in the dried state.

The height of this sponge is 13 inches, and its greatest breadth 3 inches. At 5 inches from the basal attachment the pedicle divides and becomes two branches; at the part from which the lowest of the plates of the sponge is projected, and thence to the apex, they are produced in a rather irregular series. The form of this sponge is remarkable and unusual; but the species in course of description is not the only one in which we find it. The whole of such sponges appear to be Australian. I have other specimens in my possession of very much greater dimensions, and among them some rather exceeding 3 feet in length, having plates exceeding 5 inches in diameter; and one of the largest, at about the middle of the series of plates, divides, and each stem supports a separate series of plates. The plates of these sponges are not projected from the pedicles at right angles to them; they always assume a more or less ascending direction, so that they form an ascending series of rather irregularly shaped shallow cups.

The dermal rete is rather more strongly produced than the skeleton-structures beneath it, and it is quite irregular in form. Very little of the dermal membrane remains; the small fragments that were apparent were furnished with a few dispersed spicula.

The skeleton-structure is rather slender and delicate. The primary lines vary to some extent in their diameter; and in some there are a greater number of spicula than in others. The secondary lines of the skeleton are also variable in the number of their spicula and in their mode of disposition.

These singularly formed sponges are interesting, not only on their own account, but also for affording us an explanation of a remarkable series of fossils that are not unfrequently found in a more or less perfect condition in our diluvial gravel, and which have been conjectured by some geologists to have been allied to the Trilobites, while others have believed them to have been Pennatulæ.

I had longitudinal sections made and polished of several of these fossils; and on examining them by direct light with a power of 100 linear I found in some of them traces of sponge-structure, but so indistinct as to afford very unsatisfactory evidence of their real nature; but in some, as in the specimen represented by figure 4, Plate LXXIX., I found unmistakable proofs of a central axial column; and in this specimen the included sponge was of a nut-brown colour, while the enveloping one was of a milk-white; and the two were cemented together by an intervening thin stratum of semitransparent silex, without any indication of sponge-tissue in it. This peculiarity is strictly in accordance with the natural laws of the Spongiadæ, as when two living specimens of the same species touch each other, they unite and become as one sponge; but, however closely two specimens of different species of sponge may envelop each other, they never unite and become one inseparable mass, however closely they may be allied to each other in anatomical structure.

In each section of the brown verticillate fossil sponge represented by figure 4, when viewed by direct light with a power of 175 linear, there were unmistakable evidences of a very delicate spongeous reticulation; while in the white enveloping sponge traces of a very different character of reticulate spongeous structure could be distinctly seen between the leaves of the verticillate sponge. In the latter sponge there are numerous specimens of foraminated shells of various species, such as are frequently found embedded in recent sponges of a similarly complicated structure. The enveloping sponge does not appear to be always of the same species as the sponge represented by figure 4. In the specimen represented by figure 5 (Plate LXXIX.) it is apparently the same as in that represented by figure 4; but it has not so completely involved the verticillate species, the margins of the plates of which are still uncovered.

For the most perfect specimen of these enveloped species of sponges I am indebted to my late friend Dean Buckland, who could not imagine what it could be, unless it represented an animal allied to the Trilobites, the apparent smooth head and striated body having impreseed that idea upon his mind; but on my pointing out to him a small spot on the middle of the smooth end of the mass, which I conjectured might be the basal end of the pedicle, he presented it to me that I might, if possible, clear up our doubts regarding its structure. I accordingly marked it for cutting in such a direction as to make a section of the supposed pedicle, as well as through the centre of the plates of the sponge; and the result was the production of the specimen represented by figure 4, Plate LXXIX., completely confirming the ideas regarding the nature of these fossils that had previously arisen from my examinations and comparisons of the fossils with the singular verticillate sponges from the Australian seas.

Very few of these enveloped specimens of verticillate sponges are in so perfect a state of preservation as that represented by figure 4. By far the greater number of them appear to have been in a very young state when thus enveloped by the parasitical sponge; and their size has been still further curtailed, and their true form obscured in the fossil state, by the destructive attrition that they have undergone in the diluvial gravel, in which they are by no means scarce. I have in my own collection 33 specimens of various sizes and states of preservation, among which there is one that is evidently the termination of a fossil specimen quite as large as the recent one figured, the greatest breadth of the spongeous plates being two and a quarter inches.

These fossils, from the general character of the siliceous matter in which they are embedded, probably belong to the chalk formation; but I have never yet obtained one from that deposit, and therefore the formation whence they are derived cannot be positively determined. It is a remarkable circumstance that these diluvial fossils should have their nearest analogues among the recent Australian sponges, and that the same may be said of the fossil fruits of the London-clay formation.

H

OPLITOSPONGIA FUCOIDES, sp. nov. (Plate LXXX.)

Sponge pedicellate; pedicle long, slender, smooth, ramifying and expanding into numerous compressed fucoideal branches disposed in nearly the same plane, so as to be rudely fan-shaped. Surface uneven, minutely hispid. Oscula simple, minute, dispersed. Pores inconspicuous. Dermis irregularly fibro-reticulate; rete abundantly punctiunculate, sparingly spiculous. Dermal membrane abundantly spiculous; spicula spinulate, smaller, shorter, and more attenuated than those of the skeleton. Skeleton-fibres smooth, punctiunculate, abundantly furnished with subfusiformi-spinulate spicula, radiating irregularly from the centres to the circumferences of the branches; spicula very irregular in length.

Colour, in the dried state, red.
Hab. Sharks' Bay, Western Australia.
Examined in the dried state.

I obtained this interesting species from a dealer in natural-history specimens. It is 9 inches in height and 7 inches in greatest breadth. Its mode of growth is very singular. It consists of a number of separate irregularly shaped fan-like aggregations, by anastomosis of the smaller branches, all projected in nearly the same plane, the whole forming a complicated fan-shaped mass of branches, from many of which, in numerous parts, by a careful examination, minute leaves of fuci may be seen projected; but whether these are separate and independent growths, or projections from an originally enveloped fucus, it is difficult to decide, as I could not trace any portions of the stem of a fucus in numerous sections made at right angles to the surface of the sponge, even when mounted in Canada balsam. From the very young condition of all these minute fuci, and there being two species of them, and several other parasitical bodies, such as little Barnacles, embedded in some of the branches, I am inclined to believe the small fuci to be parasites on the sponge, and not the sponge on a fucus.

The dermal surface is furnished with an irregular fibro-reticulate rete, the fibre of which does not appear to be so profusely furnished with spicula as those of the skeleton. The minute hispidation of the surface is produced by the projection of the spicula of the fibres of both the dermal rete and the skeleton immediately beneath it. This character is not visible, excepting in thin slices of the sponge made at right angles to the dermal surface when mounted in Canada balsam. The fibres of both the surface and the skeleton are very remarkable; their surfaces are profusely punctiunculated; this character is best seen in the fibres of the dermal rete, the surfaces of which are usually less abundantly spiculous than those of the skeleton. These minute dottings of the surfaces of the fibres require a power of not less than 300 linear, when sections of the sponge are mounted in Canada balsam, to render them distinctly to the eye. I have never seen this remarkable dotting of the surface of the fibres of a keratose sponge in any other species of sponge; and in the one in course of description it forms a very decisive specific character.

The structure of the skeleton is very irregular and complicated. The fibres are stout and rigid, and are profusely furnished with their defensive spicula. These organs vary to great extent in their length and diameter; one of the largest measured $\frac{1}{66}$ inch in length, while one of the numerous short ones measured only $\frac{1}{300}$ inch in length; the two forms are distributed on the fibres without the slightest approach to order. This sponge is a very remarkable species of the genus. It is unlike any of its numerous congeners.

Raphiodesma radiosa, sp. nov. (Plate LXXXI.)

Sponge irregularly rameous; branches rather slender. Surface uneven and irregular, both strongly and minutely hispid. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane pellucid, abundantly spiculous, reticulated; spicula of the rete of the same form as those of the skeleton. Tension-spicula acuate, slender, few in number; retentive spicula dentato-palmated inequianchorate, congregated in rosette-shaped groups, rather numerous, and, rarely, simple and contort bihamate spicula. Skeleton-fasciculi numerous, abundantly spiculous; spicula acuate, rather stout. Interstitial membranes sparingly furnished with the same tension- and retentive spicula as those of the dermal membrane.

Colour, in the dried state, light grey.
Hab. Savanilla, South America.
Examined in the dried state.

I received this very remarkable sponge from Mr. Moore, of the Liverpool Free Library and Museum, for examination and description. He informed me that it was collected at Savanilla, a sea-port town on the South-American coast, latitude 11° S., longitude 75° W. N.

[illegible]

What has been the nature of the basal attachment of this sponge is very doubtful; as it is at present, it appears as if it had been broken off immediately above the basal attachment. The length of the specimen represented by the figure in Plate LXXXI. is 19 inches; and its diameter averages $\frac{5}{8}$ of an inch at three inches above its present base. The whole of the surface is very uneven, and it is irregularly studded with numerous conical projections about a line or a line and a half in height; and these appear to be produced by the occasional projection of the minute irregular ramifications of the young and immature branches of the sponge at *a*. Beside these conical organs, the surface is abundantly but very minutely hispid; and this affords an excellent specific character. It is produced by the gradual radiation of the distal extremities of the fasciculi of the skeleton immediately beneath the dermal membrane, as represented by fig. 2, Plate LXXXI. This singular provision of nature for the defence of the dermal structure of the sponge is very remarkable and especially characteristic; but it can only be seen to advantage in a thin section of the sponge made at right angles to the surface, mounted in Canada balsam and viewed as a transparent object with a microscopical power of about 100 linear. The amount of the projection of the distal terminations of the spicula of these fasciculi scarcely exceeds about one third or half the length of a single spiculum; but they form a most efficient protection to the dermal structure of the sponge.

The dermal membrane affords especially valuable specific characters independently of the remarkable radial groups of defensive spicula which pass through its structure. It is very pellucid; and the rete with which it is furnished is strongly but irregularly produced, and the areas are large and mostly modifications of triangular or quadrangular forms; and where any portion of it terminates without contact with any other portions of its structures, the spicula of the termination radiate on the plane of the membrane like those which are projected through the dermis. This habit of terminal radiation of the fasciculi prevails in several other species of *Raphiodesma.* The tension-spicula are very unevenly distributed; in some parts there are very few of them, while in others they occur dispersed in very considerable numbers.

The rosette-shaped groups of dentato-palmated inequianchorate retentive spicula are rather sparingly but equably dispersed on the inner surface of the areas of the dermal network. They very closely resemble those of the type of the genus, the British species *Raphiodesma lingua*, both in the size of the groups and of the individual spicula of which they are constructed, but they are not nearly so numerous in each group as in the type specimen.

I have never found these rosette-like groups of inequianchorate spicula in any other sponges than those of the genus *Raphiodesma*, and not in every species of that genus; so that, although they cannot be considered of generic value, they are important indications of the genus whenever they are apparent. A few simple or contort bihamate retentive spicula were occasionally observed on the interstitial membranes of the skeleton; but their number was so small as to render their presence of but little value as specific characters.

The structures of the skeleton-fasciculi are longer and more continuous than in any other species of the genus with which I am familiar, so much so that the skeleton might very readily be mistaken by a hasty observation for that of a *Desmacidon*; but this illusion is dissipated by the fact that they do not form a continuous network of solid fibre as in the last-named genus, but frequently terminate in radial expansions like those of the dermal membrane and its external protected groups of defensive radiating spicula. A few rosette-shaped groups of inequianchorate spicula and a few of the bihamate ones are occasionally found on the interstitial membranes.

This sponge is the only specimen of the species that I have seen; and it is a very remarkable one. By far the greater proportion of the known species of the genus are more or less of a solid massive form; and this variation strongly illustrates the fact that there is little or no dependence to be placed on external form in regard to either generic or specific characters.

EXPLANATION OF THE PLATES.

Plate LXXVIII.

Desmacidon plumosa.

Fig. 1 represents the sponge in its dried state, rather less than half its natural size.

2, 3. Two small portions of the sponge, of the natural size, exhibiting the plumous nature of the hispidation of the surface.

4. Two of the subfusiform acerate spicula of the skeleton, × 308 linear.

5. A small portion of the skeleton-structure, × 50 linear.

Plate LXXIX.

Chalina verticillata.

Fig. 1 represents the sponge, about half its natural size.

2. One of the depresso-spinulate spicula of the skeleton, × 420 linear.
3. A small portion of the scalariform structure of the skeleton, with portions of the interstitial membrane, × 123 linear.
4 represents a longitudinal section of a diluvial flint presented to me by the late Dean Buckland, containing a fossil sponge closely allied to *Chalina verticillata*, exhibiting a section of the pedicle and the series of verticillate plates of the sponge, very closely resembling the recent sponge, natural size.
5 represents a small specimen of a fossil verticillate sponge, the margins of the plates remaining uncovered, while the intervals between them are filled by the enveloping sponge, natural size.
6. A longitudinal section of a small specimen closely resembling the one represented by figure 5, exhibiting the immature development of the verticillate plates of the sponge and a section of its central column, natural size.
7. A fine specimen of a verticillate fossil sponge, only half of which is completely enveloped longitudinally by the parasitic sponge, natural size.

Plate LXXX.

Ophlitospongia fucoidea.

Fig. 1 represents the sponge, two thirds its natural size.

2. One of the shortest of the spicula of the skeleton-fibre, × 250 linear.
3. An average-sized long spiculum of the skeleton-fibres, × 250 linear.
4. A small portion of the skeleton-fibre, exhibiting the great number of the spicula with which they are furnished, and the mode of their disposition, × 80 linear.

Plate LXXXI.

Raphiodesma radiosa.

Fig. 1 represents the sponge, rather less than half the natural size.

2. The marginal portion of a thin slice of the sponge at right angles to the surface, exhibiting the radiation of the distal terminations of the skeleton-fasciculi, projected through the dermal membrane to form the minute hispidation of the surface, × 61 linear.
3. A small portion of the dermal rete, × 61 linear.
4. One of the rosette-shaped groups of dentato-palmated inequianchorate retentive spicula, × 360 linear.
5. An acuate skeleton-spiculum, × 360 linear.

December 5, 1876.

Dr. E. Hamilton, V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of November 1876:—

The registered additions to the Society's Menagerie during the month of November were 85 in number. Of these, 36 were acquired by presentation, 14 by purchase, 4 by exchange, 3 by birth, and 28 were received on deposit. The number of departures during the same period, by death and removals, was 97.

The most noticeable additions during the month of November were as follows:—

1. Four Brazilian Cormorants (*Phalacrocorax brasilianus*), purchased Nov. 17. Of this small Cormorant of the New World no examples have ever reached us before. The birds have been placed in the Fish-house, next to the American Darters.

2. A Hooded Crane (*Grus monachus*), deposited by Mr. W. Jamrach, November 21st, under an arrangement that it is to be purchased on the 1st of January next if doing well at that time.

This species, which is quite new to us, is readily distinguishable from the allied *G. leucauchen* (also from Japan) by its smaller size and the greater amount of white on the neck. Its arrival renders our series of Cranes very complete, comprising, as it now does, 19 examples belonging to 13 species.

The following extract was read from a letter addressed to the Secretary by Count T. Salvadori, C.M.Z.S., dated Turin, November 28th:—

Dr. Beccari has received from Mr. Bruijn, of Ternate, the announcement of the discovery of a new species of *Drepanornis* from the most inland point of Geelvink Bay, New Guinea. This bird is said to differ from *D. albertisi* in having the head, the hind neck, the back, and the breast black. The long feathers on the sides of the breast are said to be most brilliant. We hope to receive before long examples of this wonderful new bird.

The following papers were read:—

1. Corrections of and Additions to the "Raptorial Birds of North-western India."—Part III.* By Andrew Anderson, F.Z.S. &c.

(Plate LXXXII.)

[Received November 6, 1876.]

The acquisition of two very interesting additions—the one an eastern and the other a western one—enables me to lay some further information respecting the Raptorial birds of these provinces before the Society. It is a strange coincidence that both these stragglers should have been obtained on my old collecting-ground, on the banks of the Mainpuri Canal, within a few miles of each other, as well as within the same month.

The numbers and asterisk preceding the names have the same significance as before.

The two additions now made bring up my list to fifty-four species.

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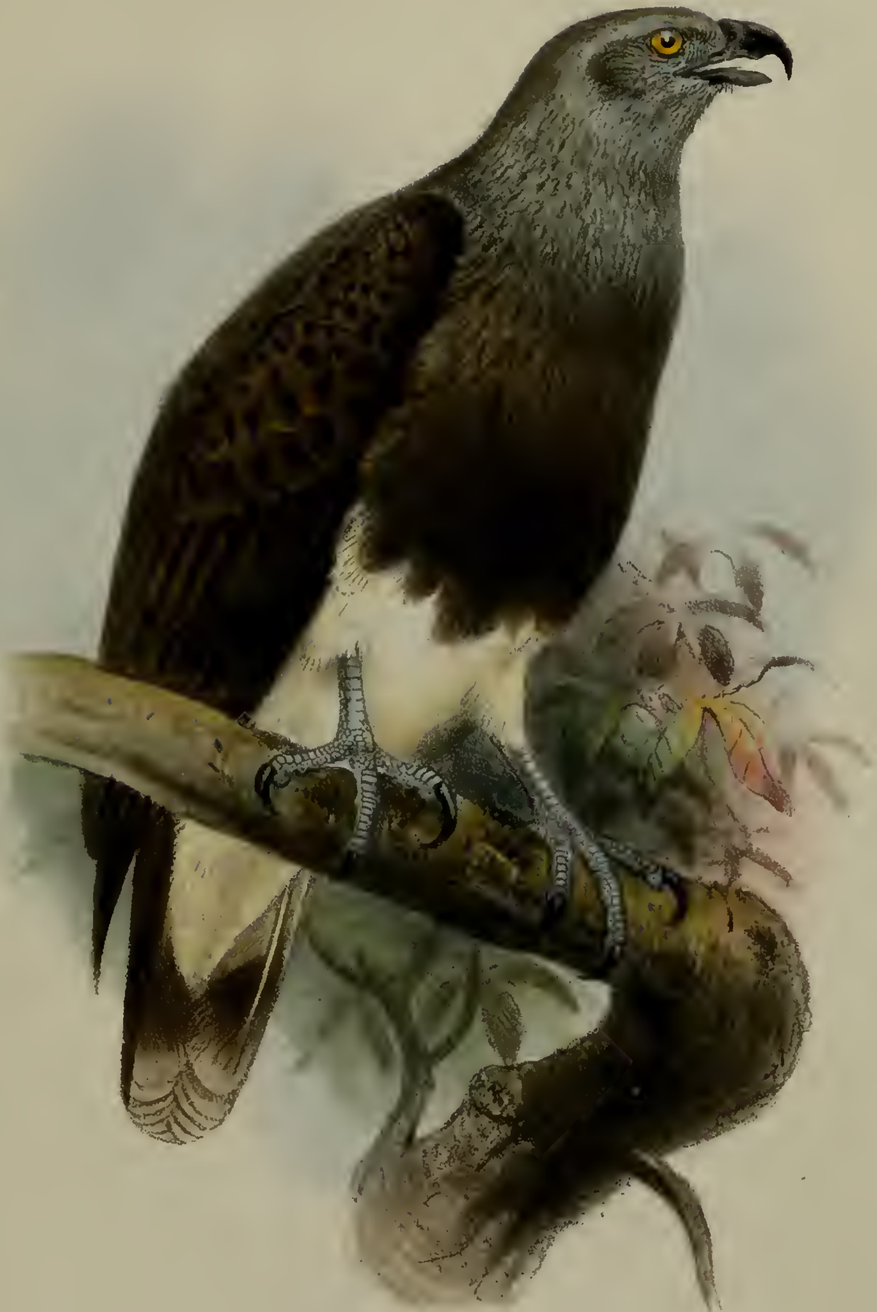
* For Part II. see P. Z. S. 1876, p. 310.



$\frac{1}{4}$

J. Smit del. et lith.

M & N Hanhart imp.

POLIOAËTUS PLUMBEUS.

BRITISH MUSEUM
Z D
NATURAL HISTORY

*41 *bis*. POLIOAËTUS PLUMBEUS. (Plate LXXXII.)

Haliaëtus plumbeus, Hodgson, J. A. S. B. vi. p. 367.
Poliaëtus plumbeus, Jerdon, Ibis, 1871, p. 336.

The accompanying Plate of this little-known Fish-Eagle will enable ornithologists to readily distinguish its characters from the allied though very distinct *P. ichthyaëtus*, from which species I have reason to believe it has not always been discriminated. As the present example, a mature ♂, making the third recorded occurrence of this Eagle in the plains*, is identical in every respect with the pair referred to in 'Stray Feathers'†, any further description of its plumage and habits would be superfluous.

It was killed at Ghirar, in the Mainpuri district, on February 9th of the present year; and had my gun been up at the time, the prize would have been easily secured, as it remained seated on a tree on the opposite side of the canal for fully half an hour. Once disturbed, the bird became very impatient; and though only taking small flights and never leaving the canal, it changed its position a dozen times and entailed a deal of manœuvring before allowing itself to be bagged. The canal was at low-water mark; and the fish which had congregated in the deep clear pools must have been the attraction to this place.

Carefully measured in the flesh, the following are the results:— Length 23·5 inches; wing from carpal joint 16·5; tail from vent 9·6; tarsus 3.5; bill, straight, including cere, 1·7; greatest expanse of foot —length 5·0, breadth 4·6, centre toe and claw straight 3·1.

The legs and feet were white, washed with light livid blue; the *upper* mandible was blue-black, the blue being distinctly visible; the cere, gape, and *lower* mandible were leaden-blue, the blue being very distinct and a good deal *lighter* than the *upper* mandible; the irides were amber-colour, and the claws were black. The pads or soles of the feet were as rough as a nutmeg-grater, thus admirably adapting them for the capture of its slippery prey.

In concluding my remarks, I wish to draw attention to the wonderful development of the ear-orifice, as well as to the slight difference there is between the sexes of this Eagle. The females, I should say, averaged from 24·5 to 25·5 inches in length, with a wing from 18 to 18·5; the males from 23·5 to 24·5, with a proportionately smaller wing. For convenience of reference, I append dimensions of the three adult specimens I have had an opportunity of examining in the flesh, and regarding the sexing of which there is no doubt:—

Sex.	Locality.	Length. in.	Wing from carpal joint. in.	Tail from vent. in.	Tarsus. in.
♂.	Kumaon......	23·0	17·5	10·0	3·3
♂.	Mainpuri......	23·5	16·5	9·6	3·5
♀.	Kumaon......	24·5	18·0	10·5	3·4

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* One, Etawah (Brooks); one, Lucknow Museum (Anderson); one, Mainpuri (Anderson).

† *Cf.* 'Stray Feathers,' vol. iii. p. 385.

I am not aware whether the nestling- and first plumage of *P. plumbeus* has yet been described.

*10. Falco sacer, Schl.

This is probably the least to be expected of all the Raptores I have hitherto recorded from this part of the country. In short, it is the first occurrence of this noble Falcon known to me so far east of the desert country of the Punjab; and as such it makes an exceedingly interesting addition to my previous lists.

It was on February 28th last, just three weeks to a day after the capture of *P. plumbeus*, that the Saker now referred to was obtained. The plain on which this bird was shot extends for miles along the banks of the Mainpuri Canal, commencing at the junction of the Etawah road, at a place called Dhurous.

There are few localities I have worked more thoroughly than this; and it offers attractions equally great to the sportsman and naturalist. The solitary trees that are studded about this open desert-looking country are each occupied by the larger eagles and birds-of-prey generally; and the marshes offer excellent retreats for water-birds, which in numbers and variety are probably not surpassed in any part of the world. The dense fringe of brush-wood of young Sisso-trees that clothe both banks of the canal, afford shelter to our migratory Thrushes, such as *Pitta bengalensis*, *Petrocossyphus cyaneus*, *Orœcetes cinclorhynchus*, *Turdus unicolor* and *T. atrogularis* (the last-mentioned having occurred in considerable numbers last winter); while the Babool trees that overlook the water are a sure find for Brooks's new Leaf-Warbler (*Reguloides subviridis*), as well as for the *Phylloscopinæ* generally, of which group my list comprises no less than a dozen species*. The labyrinth of rank high reeds and rushes which grow in patches where the water has oozed through the bank, in many places sufficiently dense to hold pigs, harbours Rails, immense flocks of Passerine birds (including *Ploceus bengalensis*, a species not recorded by Jerdon from the N.W. P.), and several Reed-Warblers, the most interesting being the skulking *Locustella hendersoni*, and *Sylvia melanopogon*, which are amongst the least-persecuted of birds, owing to the impregnable nature of the ground they affect. Should you have exhausted the ornithological treasures of an elysium like this, you have merely to make a détour of a mile or two to fall in with Blackbuck, or, better still, to course Fawns, Hares, or the Desert-Fox†.

To return to *Falco sacer*, it was just as we had run a hare to ground‡, late on the evening of the afore-mentioned date, and I was meditating with two of my brother officers who were out with me whether we had time to dig out the animal, that a Falcon was seen scouring the plain, apparently in search of food. My shikaree soon produced the bird, the first Saker I had seen in the flesh; and though it is pale rufescent, or "desert-colour" generally, the oval spots on its rectrices, and light-coloured soft parts, as compared with *Falco jugger*, convinced me that it did not belong to that species, it was not until the following morning, when I had an opportunity of comparing it with several Laggars, that I really felt comfortable in my identification.

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* A Catalogue of the Birds of the Plains *proper* that I have recently drawn up for the 'Provincial Gazetteer,' contains 443 species; but of course this list makes no pretension to completeness.

† *Vulpes leucopus* is not recorded by Jerdon from the N.W. P.; but it is the Fox of the *large sandy downs* of all the districts to the *west of Cawnpore*. Not long ago I killed a splendid female of this fine species within a mile of the city of Futtehgurh.

‡ Jerdon, it will be observed, on referring to his 'Mammals of India,' p. 224, was well aware of the eccentric habit of this common Indian Hare (*Lepus ruficaudatus*).

The bird proved to be a very old but small male, measuring 18·5 inches in length, with a wing of 13·5, or about the dimensions of an undersized ♀ *F. jugger*. From the *adult* of that species it differed most conspicuously in the coloration of its soft parts, the legs, feet, and cere of the latter being *bright orange*, while in the former (Saker) the corresponding parts are of a *light dingy yellow*; the bill too was paler, the basal three fourths of the upper mandible, as also the whole of the lower one, being of a *pearly white tinged with pink*.

As the various phases of the plumage of *F. sacer* have been so fully described by Hume*, I will merely remark in reference to the adult state of the present specimen, that the head and nape (particularly the latter) are pure white, with narrow central shaft-stripes, the mantle is of a uniform pale rufescent hue, the feathers being broadly edged with rufous of a darker shade, that *all* the rectrices have large oval white spots on both webs, with the exception of *one of the central feathers, on which the spots have almost disappeared*, and that the chin, throat, and breast are pure white, with only a few clove-brown spots across the breast, the markings on the sternum, flanks, abdomen, and tibial plumes being more numerous and having the form of ovate streaks instead of spots.

Before leaving the subject of *F. sacer*, I should not omit to mention that the specimen in question has an abnormally shaped upper mandible, the tip of the bill, which is very sharp and pointed, being produced a third of an inch beyond the tooth or notch, and rounded over exactly as it is in the genus *Palæornis*. In reference to this deformity, the following remarks by Mr. Gurney (*in epist.*) will be read with interest:—"May not your *F. sacer* with the deformed bill have been a trained bird that had been turned off when it got old and past its best? I have known birds of prey acquire a similar prolongation of the upper mandible in confinement, though perhaps not to the same extent" †.

The Falcon, however, was in excellent condition, and showed no sign of previous captivity. Furthermore, it was evidently hunting on a plain that abounded with Hardwick's Uromastix, a Lizard that Jerdon has pointed out, on the authority of Punjab falconers, as constituting its "favourite food" in a feral state ‡; and as I can hardly believe that a Saker that had once been trained to strike such large game as the Bustard and Crane would revert to reptilian food,

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* *Cf.* 'Stray Feathers,' vol. i. p. 152 *et seqq.*

† I possess a female specimen of *Pyrrhulauda grisea* that has a similar prolongation of the upper mandible.

‡ *Cf.* 'The Ibis' for 1871, p. 239.

I trust Mr. Gurney will pardon my protesting against the belief that my Falcon was a "ticket-of-leave" bird.

48. Poliornis teesa, Frankl.

In the coloured eggs of the White-eyed Buzzard referred to in my last communication on this subject*, we have a very good illustration of the importance of oology as an element in the classification of birds, showing that *Poliornis* forms, as it were, the connecting link between the genera *Buteo* and *Circus*†.

During the past spring I was so fortunate as to obtain two pairs of even better-coloured eggs than those above alluded to. These I will endeavour to describe as follows:—(i.) Nest of two eggs, Futtehgurh, 5th April, 1875. These are somewhat undersized, in shape of a broad oval, and freely marked with reddish-brown specks at the obtuse end. In one specimen the markings extend more or less all over the surface of the egg. (ii.) Nest of two eggs, Futtehgurh, 27th April 1876. A full-sized pair; one is a broad oval, the other somewhat pyriform. The former has a few russet-brown blotches at one end only, one of the marks being the size of a large pea. The colouring-matter in the companion egg is confined to the compressed end, covering about a fifth of the surface, and consists of delicate russet-brown veined or map-like markings, which are so characteristic of the Bunting group.

Admitting my weakness for oological discoveries, I must not omit to mention that on April 12th I took a clutch of *five* eggs of *Micronisus badius*, which is in excess of the number hitherto recorded. Another sitting of four, taken three days later, are freely marked with minute specks of a reddish-brown colour. I venture to say Mr. Hume is in error in assigning only three eggs to this Hawk as a general rule‡; for, according to my experience, four is the normal number if the bird is allowed time to lay the full complement.

I have also recently come across two very prolific pairs of *Athene brama*, capturing both the ♀ birds in their nest-holes: the one had laid *six* eggs; while the other was sitting on the usual number, four, but laid a fifth in my hand.

Though not coming strictly within my limits, I may mention the capture at Allahabad, on Oct. 10th of the past year, of a ♀ *Spizaëtus nipalensis*, regarding which Mr. Cockburn, the Curator of the Museum at that place, has favoured me with the following particulars:—Length 27·5; expanse 58·5; wing 17·5; tail from vent 12; tarsus 3·5. Crest rudimentary. This is the first specimen of this bird that has, to my knowledge, been procured in the Allahabad district§. I knocked it over with a charge of No. 10 shot while in the act of devouring a Crow-Pheasant."

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* *Cf.* P. Z. S. for 1875, p. 25.

† *Cf.* 'Nests and Eggs,' pt. i. p. 51, where the only known eggs of *P. liviventer* are described as having a "very few tiny pale brown and purplish brown specks" on them.

‡ *Cf.* 'Nests and Eggs,' pt. i. p. 25.

§ Mr. Hume, in his article on *Spizaëtus cirrhatus*, 'Rough Notes,' p. 206, records *S. nipalensis* from Etawah; but I have not yet met with this species myself in the Plains.

To Dr. Bonavia, of Lucknow, I am indebted for a third Oudh-killed specimen of *Erythropus pekinensis*. Though an adult ♂, it has a few minute specks on the sternum; and in reference to the difference in the plumage of the two species of Lesser Kestrels, I may add that Mr. Gurney agrees with me that the only *constant* difference between *Erythropus cenchris* and *E. pekinensis* is the breadth of grey on the wing.

Athene radiata is, I find, very common in the districts north of the Ganges; though somewhat local, in many places it almost replaces *A. brama*. I procured a fine series of the former at Shahjehanpore in November last, within a radius of two hundred yards of my camp. These little Owlets have the habit of sitting in pairs, and sunning themselves, frequently up to midday, before retiring to their hiding-places. One shot generally kills both birds. They utter a peculiar and, to me, a pleasant note, something of a chirp in several keys, very different from the discordant noise made by *A. brama*. The following dimensions and colours of soft parts are applicable to a dozen specimens I have examined:—

	Length. in.	Wing from carpal joint. in.	Tail from vent. in.	Tarsus. in.
♂	8·0	5·7	3·0	1·0
♀	8·3	5·9	3·1	1·1

I have also secured at Futtehgurh more examples of *Aquila pennata*, *Accipiter virgatus* (only immature ones), and *Ephialtes sunia*, all good birds for the locality. Of the last mentioned I have a live specimen in the grey phase of plumage, which swallows full-grown mice *whole*—a feat not a little surprising for a bird weighing only two oz.

2. On the Fishes of Yarkand.

By Francis Day, F.Z.S.

[Received November 20, 1876.]

In the year 1873 an expedition, under Mr. (now Sir) Douglas Forsyth, was despatched by the Government of India to Yarkand, having for one of its objects the collection of specimens of Natural History. For this latter purpose my lamented friend Dr. Stoliczka was attached to it as naturalist; and after his death the collection of fishes was conveyed to India, and subsequently forwarded to me in this country for identification and description.

The illness and subsequent death of Mr. Ford, the eminent artist, has delayed the execution of the Plates, and, as a consequence, my portion of the work.

The following notes refer to the entire collection of fishes obtained during the expedition (except, so far as I know, two specimens *).

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* Two specimens of *Schizothorax chrysochlorus*, obtained during the expedition, were presented to the British Museum. They were named after their donor, *Schizothorax biddulphi*.

With them I have compared some types of Steindachner's excellent paper on Dr. Stoliczka's 'Fishes of Tibet' (Verh. z.-b. Ges. Wien, 1866), which specimens were given me by Dr. Stoliczka.

Mr. Hume, C.B., has since then obtained a few more skins of fishes from those regions through the exertions of Dr. Scully. These have likewise been forwarded to me; and one appears to be at present undescribed; it is a very aberrant form of *Ptychobarbus*.

Order PHYSOSTOMI.

Family SILURIDÆ.

1. EXOSTOMA STOLICZKÆ.

D. $\frac{1}{6}$, P. $\frac{1}{12}$, V. $\frac{1}{5}$, A. 6, C. 15.

Length of head from 4 in the young* to $5\frac{2}{3}$, of caudal 8, height of body $7\frac{1}{4}$ in the total length. *Eyes* minute, situated in the middle of the length of the head; the width of the interorbital space equals half that of the snout, or the distance between the eye and hind nostril. *Head* depressed, as broad as long, and obtusely rounded. Mouth inferior; lips thick, and studded with small tubercular elevations; the upper and lower lips continuous at the angle of the mouth; but the transverse fold across the lower jaw is interrupted in the middle. Nostrils close together, the anterior round and patent, the posterior tubular: a barbel divides the two nostrils; it is situated on a bridge of skin, below which the two nostrils are continuous. *Barbels*: the nasal ones reach the hind edge of the eye; the maxillary ones have a broad basal attachment, and reach the root of the pectoral. Of the mandibular barbels the anterior are situated just behind the inner end of the lower labial fold; they are shorter than the outer pair, which latter extend to the gill-opening. *Gill-opening* situated on the side of the head in front and above the base of the pectoral fin. *Teeth*: several rows of pointed ones in each jaw, of which the outer is slightly the larger, rather wide apart, and with rather obtuse summits. *Fins*: the dorsal arises midway between the snout and the commencement of the adipose fin; its greatest height is one third more than the length of its base; its spine is rudimentary and enveloped in skin. Adipose dorsal very long and low. Pectoral nearly as long as the head, having its outer half horizontal and its inner vertical; its spine is rudimentary, with a broad, striated, cutaneous covering. Ventral of a similar form to the pectoral; its first and a portion of its second ray also with a striated cutaneous covering; the fin commences on a vertical line falling just behind the base of the dorsal fin; it is rather nearer the

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* The remarkable difference in the comparative length of the head to that of the total length is shown in the following figures:—

3	specimens	4	inches in length.	Head	4 to $4\frac{1}{3}$	in the total length.
4	„	4·2 to 4·5	„	„	$4\frac{1}{3}$ to $5\frac{1}{4}$	„
5	„	5·0 to 5·7	„	„	5 to $5\frac{1}{2}$	„
3	„	6·0 to 6·6	„	„	$5\frac{1}{2}$ to $5\frac{2}{3}$	„
2	„	7	„	„	$5\frac{1}{3}$ to $5\frac{1}{2}$	„

snout than the posterior end of the adipose dorsal, and commences midway between the bases of the ventral and caudal fins; it is half higher than long. Caudal cut almost square. Free portion of the tail half higher than long. *Skin* tuberculated from the head, along the lower surface of the body, to nearly as far as the base of the ventrals. *Colours*: of a dull yellowish green, becoming lightest along the abdomen. Fins yellowish, with dark edges or bands.

Hab. Basgo, Sneema, and Leh or Ladak on the head-waters of the Indus. The longest specimen 7 inches in length.

I propose here to shortly remark upon the distinction between the six species of *Exostoma* at present known.

A. *Teeth in jaws pointed.*

1. *Exostoma labiatum.* Lower labial fold uninterrupted. The interspace between the first and adipose dorsal fins equals two thirds the length of the latter. Anal commences much nearer the base of the caudal than the base of the ventral. Mishmee Mountains, East Assam.
2. *E. blythii.* Lower labial fold uninterrupted. Interspace between dorsal fins very slight. Anal commences in last third of distance between ventral and base of caudal. Head-waters or affluents of Ganges.
3. *E. berdmorei.* Snout more pointed. Caudal forked. Tenasserim.
4. *E. davidi* *. The interspace between the first and adipose dorsal fins equals the length of the latter. Pectoral reaches the ventral. Eastern Tibet.
5. *E. stoliczkæ.* Lower labial fold interrupted. Anal commences nearer the base of the ventral than that of the caudal. Pectoral does not extend to the ventral. Upper waters of Indus.

B. *Outer row of teeth flattened.*

6. *E. andersonii.* Lower labial fold interrupted. Bhamo.

Family CYPRINIDÆ.

The majority of the fishes in the collection consist of Carps, those from the more elevated regions being confined to such as have the vent and base of the anal fin bounded by a row of tiled scales, and of the ubiquitous Loaches.

Genus OREINUS, M'Clelland.

Only one species exists in this collection, the *O. sinuatus*, Heckel, from Leh or Ladak, and which has likewise been captured in Cashmere.

Although some of the specimens were obtained in Cashmere, where the genus *Oreinus* has representatives, there was no example of one of these fishes from that locality in this collection.

Having observed upon the great variation in proportions existing in a species of *Exostoma* captured on the Hills, it may be worth while drawing attention to the same fact as occurring in specimens of this genus. Thus, in examining the following ten examples of *O. richardsonii*, Gray, in the British Museum, I found them as follows:—

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* Equals *Chimarrichthys davidi*, Sauvage.

4 specimens, in spirit, from 3·3 to 3·8 inches in length. Head from 4 to $4\frac{2}{3}$ in the total.

1	specimen,	in spirit,	4	inches in length.	Head	$4\frac{1}{4}$	in the total.
1	,,	,,	$5\frac{1}{2}$	,,	,,	$4\frac{1}{2}$	,,
1	,,	,,	9	,,	,,	$5\frac{1}{3}$	,,
1	,,	stuffed,	10	,,	,,	5	,,
1	,,	,,	15	,,	,,	$5\frac{1}{3}$	,,
1	,,	,,	18	,,	,,	6	,,

Of the *Schizothorax*, or more essentially mountain-Barbels, there are several species.

2. SCHIZOTHORAX CHRYSOCHLORUS.

Racoma chrysochlora, M'Clell. Cal. J. N. Hist. ii. p. 577. t. xv. f. 3.

Schizothorax biddulphi, Günther, Ann. & Mag. Nat. Hist. 1876, xvii. p. 400.

B. iv., D. $\frac{4}{7-8}$, P. 18, V. 10, A. $\frac{2}{6}$, C. 20, L. l. 110 to 120.

Length of head $4\frac{3}{4}$ to $5\frac{1}{3}$, of caudal 6 to $6\frac{1}{3}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*: diameter $5\frac{1}{2}$ (in a fish 7 inches long), 7 to 9 in the length of head, 2 to $2\frac{1}{2}$ diameters from the end of snout, and the same apart. Upper surface of the head nearly flat; its width rather exceeds its height, and equals half its length. Snout rather compressed, and overhanging the upper jaw. Mouth directed forwards, horseshoe-shaped, the lower labial fold interrupted in the middle. The maxilla reaches to below the front nostril. The depth of the cleft of the mouth equals the width of its gape. A very thin horny covering to the inside of the lower jaw. Posterior edge of opercle cut square. *Barbels*: the rostral ones as long as the eye, the maxillary rather longer, sometimes twice as long, and reach to beneath the middle or hind edge of the orbit. *Teeth* pharyngeal 5, 3, 2 . 2, 3, 5, pointed, and with rather compressed summits. *Fins*: the dorsal, which is as high as the body, arises midway between the end of the snout and the base of the caudal, its last undivided ray osseous, strong, finely serrated posteriorly, from a little longer than the head, in a specimen 11·9 inches in length, to $\frac{4}{5}$ the length in the adult. Pectoral as long as the head excluding the snout; it reaches halfway to the base of the anal. Anal, when laid flat, reaches about halfway to the base of the caudal, which latter fin is forked. *Scales*: the row which bears the lateral line consists of larger scales than those above or below it; those forming the anal sheath are equal to half a diameter of the eye. *Colours*: greyish along the back, becoming yellowish-white on the sides and beneath; a black mark over the eye, and a few dull spots on the back.

Hab. Kashgar, Yankihissar, and Yarkand, up to 20 inches in length.

Dr. Scully collected four specimens in Kashgar (4043 feet above the sea), which are 13, 16, 17, and 18 inches respectively in length. Of specimens from the Yarkand collection which have found their way into the British Museum, one is 14 inches long, from Kashgar; the other 16 inches, from Yarkand.

3. SCHIZOTHORAX PUNCTATUS, sp. nov.

B. iv., D. $\frac{4}{8}$, P. 20, V. 11, A. $\frac{2}{5}$, C. 20.

Length of head $3\frac{3}{4}$ to 4, of caudal $5\frac{1}{2}$, height of body 6 to 7 in the total length. *Eyes,* diameter $6\frac{2}{3}$ in the length of head, $2\frac{1}{2}$ diameters from end of snout, and 2 apart. Interorbital space flat. The greatest width of the head exceeds its height by one fourth, and is $\frac{4}{9}$ of its length. Mouth anterior, with the upper jaw somewhat the longer; the cleft commencing opposite the middle of the eyes, whilst the maxilla reaches to below the front edge of the orbit. Lower labial fold interrupted in the middle. A thin striated horny covering to the lower jaw. *Barbels*: the maxillary ones equal the diameter of the eye; the rostral ones are slightly longer. *Fins*: dorsal rather higher than the body; it commences midway between the front edge of the eye and the base of the caudal fin; its last undivided ray is strong, coarsely serrated posteriorly, and as long as the postorbital portion of the head. Pectoral does not quite reach the ventral, which latter arises on a vertical line below the first articulated dorsal ray, and extends two thirds of the distance to the anal. Anal rather above twice as deep as its base is long; when laid flat it does not extend to the commencement of the caudal. Free portion of the tail one half longer than deep at its highest part. *Scales*: those along the lateral line larger than those above or below it. The tiled row along the base of the anal fin small, and equalling one third of the diameter of the orbit. *Colours*: silvery, covered with largish black spots.

Racoma nobilis, M'Clelland, has more fleshy lips, whilst the mouth appears more transverse, as in *Oreinus,* and the under jaw much the shorter.

Hab. Cashmere Lake.

4. SCHIZOTHORAX ESOCINUS.

Schizothorax esocinus, Heckel, Fische Kasch. p. 48, t. ix.; M'Clelland, Calc. Journ. Nat. Hist. ii. p. 579; Günther, Cat. vii. p. 166.

B. iv., D. $\frac{4}{8}$, P. 20, V. 10, A. 7, C. 20.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal $5\frac{3}{4}$, height of body $7\frac{1}{4}$ in the total length. *Eyes*: diameter $6\frac{1}{2}$ in the length of head, 2 diameters from end of snout and also apart. Interorbital space flat. The greatest width of the head equals its height or its postorbital length. Mouth very slightly oblique, horseshoe-shaped; the maxilla reaching to nearly below the front edge of the eye. Lower labial fold interrupted in the middle. A horny covering to inside of lower jaw.

Barbels: the rostral ones more than half longer than the eye, reaching to below its first third; the maxillary ones are slightly shorter. *Fins*: the dorsal as high as the body; it commences midway between the nostrils and the base of the caudal; its last undivided ray osseous, coarsely serrated posteriorly, and its bony portion being as long as the head, excluding the snout. Pectoral does not quite reach the ventral, which latter fin commences on a vertical line slightly behind the origin of the dorsal, and extends two thirds of the distance to the anal. Length of base of anal $\frac{3}{7}$ of its height; it reaches, when laid flat, to the base of the caudal, which latter fin is deeply forked. Free portion of the tail as high at its base as it is long. *Colours*: silvery, with numerous black spots most distinct in the upper half of the body.

Hab. Leh or Ladak, on the head-waters of the Indus, Cashmere, and Afghanistan.

5. SCHIZOTHORAX INTERMEDIUS.

Schizothorax intermedius, M'Clelland, Calc. Journ. Nat. Hist. ii. 1842, p. 579; Günther, Cat. vii. p. 165.

B. iv., D. $\frac{4}{7\text{–}8}$, P. 19, V. 10, A. $\frac{2}{6}$, C. 20, L. l. 105.

Length of head $4\frac{3}{4}$, of caudal 5 to 6, height of body 6 in the total length. *Eyes*: diameter $5\frac{1}{2}$ in the length of head, $1\frac{2}{3}$ diameter from the end of snout and also apart. Upper surface of the head flat; its greatest width equals its postorbital length, whilst its height equals its length excluding the snout. Upper jaw rather longer than the lower, and not overhung by the snout. Mouth horseshoe-shaped, the depth of the cleft equalling the width of its gape. The maxilla reaches to below the hind nostril. Lower labial fold interrupted in the middle. A thin, smooth, deciduous, horny covering to the lower jaw. *Barbels* four, as long as the eye in the young, longer in the adult. *Teeth* pharyngeal, 5, 3, 2 . 2, 3, 5, pointed and rather crooked at their summits. *Fins*: dorsal as high as the body in the young, not quite so high in the adult; it commences midway between the end of the snout or front nostril and base of the caudal; its last undivided ray strong, rather coarsely serrated posteriorly, one half to two thirds as long as the head in the immature, four fifths of its length in the adult. Pectoral as long as the head excluding the snout, and reaching more than halfway to the base of the ventral, which latter fin arises below the first dorsal ray and extends more than halfway to the anal. The length of the base of the anal equals half its height, which latter equals the length of the pectoral; if laid flat it almost reaches the base of the caudal, which is forked. *Scales*: depth of those in tiled row equals half a diameter of the eye. Free portion of the tail about as high at its commencement as it is long. *Colours* silvery, usually without spots; but in some specimens from Yankihissar there are minute black spots on the upper half of the body.

Hab. Kashgah, Yankihissar, and Sirikol. M'Clelland likewise obtained it (through Griffith) from Afghanistan, the Cabul river at

Jellalabad, and Tarnuck river. He sent three specimens to the East-India Museum.

6. SCHIZOTHORAX MICROCEPHALUS, sp. nov.

B. iv., D. $\frac{3}{9}$, P. 18, V. 11, A. $\frac{2}{5}$, C. 18, L. l. 105, L. t. 25/.

Length of head 5 to $5\frac{1}{2}$, of caudal 6, height of body $5\frac{3}{4}$ to 6 in the total length. *Eyes*: diameter 7 in the length of head, $2\frac{1}{4}$ diameters from end of snout, and $2\frac{1}{4}$ apart. Interorbital space flat. The greatest width of the head equals its length behind the middle of the eyes; its height equals its length excluding the snout. Mouth broad, anterior, with the upper jaw the longer, and overhung by the snout; the cleft of the mouth nearly horizontal, it extends to below the hind nostril, and is scarcely above half the extent of its gape; lower labial fold interrupted in the middle. A thin horny covering to the lower jaw. *Barbels*: the rostral ones reach to below the hind edge of the eye, the maxillary ones to the hind edge of the preopercle. *Fins*: dorsal anteriorly nearly as high as the body, commencing slightly nearer the snout than the base of the caudal fin, or midway between the two; its last undivided ray weak, articulated, and with some very small obsolete denticulations posteriorly about its centre (absent in some specimens). Pectoral as long as the head behind the front nostril, and reaching rather above halfway to the ventral, which latter is shorter than the pectoral, reaching about halfway to the base of the anal. Anal almost reaching base of caudal when laid flat, the length of its base being only one third of its height. Caudal with rounded lobes. Free portion of the tail rather longer than high. *Scales*: in the first third of the body those along the lateral line are larger than those above or below them, but posteriorly they are of the same size; the tiled row equal about half the diameter of the eye. *Colours* silvery.

M'Clelland says of *S. edeniana* that its spine is slender, soft, and denticulated at its base, but the reflected fold of the lower lip is uninterupted. *Racoma gobioides*, M'Clell., from the Bamean river, shows the head almost as short as in this species; but it has a strong serrated dorsal spine, whilst that fin is on an elevated base. The anal does not appear to reach above halfway to the base of the caudal.

Hab. The specimens are from Panja (9000 feet), the waters going to the Oxus. The dorsal spine approaches that of *Ptychobarbus*.

7. SCHIZOTHORAX IRREGULARIS, sp. nov.

? *Schizothorax edeniana,* M'Clell. Calc. J. N. H. ii. p. 579.

B. iv., D. $\frac{3}{9}$, P. 18, V. 9, A. $\frac{2}{5}$, C. 20, L. l. 98, L. tr. 26/.

Length of head 5, of caudal 6, height of body 6 in the total length. *Eyes*: diameter $6\frac{1}{2}$ in the length of head, $2\frac{1}{2}$ diameters from the end of snout, and about 2 apart. Interorbital space nearly flat. The greatest width of the head equals its height or its length behind the orbit. Mouth narrow; the upper jaw slightly the longer, and only slightly overhung by the snout. Cleft of mouth a little oblique, its width equal to its length, and the maxilla reaching to beneath the front nostril. Lips very thick, lobed in the centre, and with an interrupted labial fold. *Barbels*: the rostral ones reach to below the front edge of the eye; the maxillary ones are one half longer than the diameter of the eye. *Fins*: dorsal anteriorly about two thirds as high as the body below it; its last undivided ray weak, very feebly serrated posteriorly, whilst the extent of its osseous portion does not exceed one third of the length of the head; the fin commences midway between the front edge of the eye and the base of the caudal fin. Pectoral as long as the head excluding the snout, and reaching halfway to the ventral, which latter is rather shorter and extends rather more than halfway to the base of the anal. Anal two fifths as long at its base as it is high, when laid flat it almost reaches the caudal, which latter is slightly forked. Free portion of the tail rather longer than high at its base. *Scales*: those behind the pectoral region to as far as the end of the anal, and below the lateral line, are much smaller than those above the lateral line. The tiled row small, not above half the diameter of the eye. *Colours*: silvery, becoming lightest and glossed with gold below the lateral line.

Hab. The specimen described is stuffed, and 20·5 inches in length. It was obtained as Tash-kurgan. If this is identical with *S. edeniana*, M'Clell., it is also found in the Cabul river, in the Mydan valley, and Sir-i-chusmah.

8. SCHIZOTHORAX NASUS.

Schizothorax nasus, Heckel, Fische Kasch. p. 33. t. vi.; Günther, Cat. vii. p. 166.

B. iv., D. $\frac{4}{8}$, P. 18, V. 10, A. $\frac{2}{5}$, C. 19, L. l. 90–100.

Length of head $4\frac{2}{3}$, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*: diameter $5\frac{1}{4}$ in the length of head, $1\frac{1}{2}$ diameter from the end of snout, and also apart. Dorsal profile more convex than that of the abdomen. Upper surface of the head nearly flat; its greatest width equals its postorbital length, while its height equals its length excluding the snout. Upper jaw rather longer than the lower and overhung by the snout. Mouth horseshoe-shaped, its gape equalling its cleft. The maxilla reaches to below the hind nostril. Lower labial fold interrupted. *Barbels* four; the maxillary ones two thirds as long as the eye; the rostral ones slightly shorter. *Fins*: dorsal as high as the body below it; it commences midway between the middle of the eye and the base of the caudal fin; its last undivided ray is strong, rather coarsely serrated, and nearly as long as the head. Pectoral about as long as the head excluding the snout, and reaching above halfway to the base of the ventral, which latter fin arises below the last undivided dorsal ray, reaching halfway to the base of the anal, which is above twice as high as wide at its base, and nearly reaches the caudal when laid flat. *Scales*: depth of those in the tiled row scarcely one third of the diameter of the eye. Free portion of the tail not quite so high at its commencement as it is long. *Colours*: silvery, with black spots on the upper half of the body.

This species has a more elevated dorsal profile and shorter barbels than *S. intermedius*.

Hab. Cashmere Lake.

9. PTYCHOBARBUS CONIROSTRIS.

Ptychobarbus conirostris, Steindachner, Verh. z.-b. Ges. Wien, 1866, p. 789, t. xvii. f. 4; Günther, Cat. vii. p. 169.

B. iv., D. $\frac{2}{8}$, P. 22, V. 10, A. 7–8, C. 19, L. l. 95, L. tr. 24/.

Length of head $4\frac{3}{4}$ to 5, of caudal $7\frac{1}{4}$, height of body $6\frac{1}{4}$ to $6\frac{3}{4}$ in the total length. *Eyes*: diameter from $4\frac{1}{4}$ to $5\frac{1}{4}$ in the length of the head, 2 diameters from the end of snout, and $1\frac{1}{4}$ apart. The greatest width of the head equals its postorbital length, but is slightly less than its height. Mouth horseshoe-shaped, with the upper jaw a little the longer, and rather overhung by the snout; the maxilla reaches to below the front edge of the eye. Lower labial fold very broad, uninterrupted, and with a cleft in the median line posteriorly. *Barbels*: a pair at the angle of the mouth, which reach the posterior edge of the preopercle; in a small specimen, 3·1 inches long, they only equal $\frac{1}{2}$ a diameter of the eye in extent. *Teeth*: pharyngeal ones in two rows. *Fins*: the dorsal commences much nearer the snout than the base of the caudal, its entire base being equidistant from these two points; it has no osseous ray, and is as high as the body below it. Pectoral as long as the head behind the nostrils, and does not reach quite so far as the ventral, which latter fin arises under the last few dorsal rays and reaches two thirds of the distance to the base of the anal. The anal, when laid flat, reaches the base of the caudal, its base is $2\frac{1}{3}$ in its height. *Scales*: the tiled row small, not one third of the diameter of the eye. *Colours*: silvery, darkest along the back and upper half of body, where most of the scales have black margins, thus causing small reticulations in the colour. Upper surface of the head spotted with black; some spots on the dorsal fin, and sometimes a few light ones on the caudal.

Hab. Head-waters of Indus, Hanli in Tibet, and Chiliscorus.

10. PTYCHOBARBUS LATICEPS, sp. nov.

B. iv., D. $\frac{4}{6}$, P. 18, V. 9, A. ?, C. 20, L. l. 145.

Length of head $4\frac{1}{4}$, of caudal $9\frac{1}{2}$, height of body 7 in the total length. *Eyes*: diameter 12 in the length of head, $2\frac{1}{2}$ diameters from the end of snout, and also apart. Mouth anterior, with the lower jaw somewhat the longer; the depth of the cleft of the mouth equals half the width of the gape. Upper surface of the head broad, its width being nearly twice its height. No lower labial fold under the mandible. *Barbels*: a maxillary pair as long as the eye. *Fins*: dorsal arises slightly nearer the base of the caudal than the end of the snout; its last undivided ray weak, articulated at its extremity, and not serrated. Pectoral two fifths as long as the head. Ventral arises below the anterior dorsal rays. Caudal forked. *Scales*: are scarcely imbricated, but cover the entire body; those forming the tiled sheath along the base of the anal fin are two thirds of the diameter of the eye. *Colours*: silvery superiorly, becoming dull white beneath; a few blackish spots along the back.

This interesting skin has unfortunately had its anal fin removed, whilst the pharyngeal teeth have not been preserved. The specimen is 52 inches in length.

It may be considered that as this fish differs from *P. conirostris* in the form of its mouth and snout, also in the position of the ventral fin, it might form a new genus; but we have yet much to learn of the mountain Barbels; perhaps a more extensive acquaintance will decrease the genera into which they are at present subdivided.

Hab. Kashgar (4043 feet elevation), the river from which place eventually joins the Yarkand river.

11. PTYCHOBARBUS LONGICEPS, sp. nov.

B. iv., D. $\frac{4}{8}$, P. 19, V. 12, A. $\frac{2}{5}$, C. 20, L. l. 112, L. tr. 31.

Length of head $3\frac{2}{3}$ to 4, of caudal 7 to $7\frac{1}{2}$, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*: diameter 7 to 9 in the length of head, $1\frac{1}{2}$ diameter from the end of snout, and 2 apart. Mouth anterior, cleft oblique, commencing superiorly opposite the upper margin of the eye. Lower jaw somewhat the longer; the maxilla reaches to below the middle of the eye. The greatest width of the head rather exceeds its height, and equals half its length. Interorbital space flat. No lower labial fold under the mandibles. *Barbels*: a maxillary pair half as long as the eye. *Fins*: the dorsal commences midway between the hind edge of the preopercle and the base of the caudal fin. Its last undivided ray is osseous, of moderate strength, and very finely serrated posteriorly; its osseous portion equals a little above one fourth of the length of the head. Pectoral half as long as the head, and reaches halfway to the ventral; the latter fin commences under the first divided dorsal ray, and does not extend quite halfway to the root of the anal. Anal twice as high as its base is long; it does not reach the caudal when laid flat; the latter fin forked. *Scales* oval, nearly as wide as high and slightly imbricate; the tiled row half the diameter of the eye. Free portion of the tail rather longer than high. *Colours*: bluish on the back, lightest below, dorsal and caudal spotted.

Hab. Yarkand, whence the stuffed specimen described was brought. It is 31 inches in length. This species scarcely accords with the definition of *Ptychobarbus*, the last undivided dorsal ray being osseous and finely serrated; but the specimen is large, whilst *P. laticeps* forms the intermediate form between it and *P. conirostris*.

12. SCHIZOPYGOPSIS STOLICZKÆ.

Schizopygopsis stolickæ, Steind. Verh. z.-b. Ges. Wien, 1866, p. 785; Günther, Cat. vii. p. 170.

B. iv., D. $\frac{3-4}{7-8}$, P. 13, V. 11, A. $\frac{2}{5-6}$, C. 19.

Length of head 5 to $5\frac{3}{4}$, of caudal $5\frac{1}{2}$ to $5\frac{3}{4}$, height of body 7 to 8 in the total length. *Eyes*: diameter 4 to 5 in the length of head, 1 to $1\frac{1}{2}$ diameter from end of snout, and $1\frac{1}{2}$ to 2 apart. The greatest width of the head equals its length behind the middle of the eyes; and its height equals its length excluding the snout. Mouth inferior, overhung by the snout; the maxilla reaches to below the front edge of the eye. A sharp, anterior, horny edge to the mandible. *Barbels* absent. *Fins*: the dorsal commences about midway between the end of the snout and the root of the caudal; its upper edge is nearly straight, oblique; the fin is as high as the body below it, and one third higher than its base is long; its last undivided ray osseous and finely serrated posteriorly. Pectoral not quite so long as the head, and reaching rather above halfway to the ventral, which latter, arising below the middle of the dorsal, is slightly the shorter, and does not reach the anal. Anal, when laid flat, reaches the base of the caudal; it is rather above twice as high as its base is long. Caudal deeply forked. Free portion of the tail as high as long. *Lateral line*: at first descends gently, and, then reascending, attains the middle of the body opposite the posterior extremity of the dorsal fin. *Colours*: olive superiorly, becoming white on the sides and beneath; the whole covered with irregular blackish spots.

The ova are comparatively large. The serrated dorsal spine is strongest in specimens from Leh.

These fishes appear to be much attacked by parasites, which occasion yellowish elevated tubercles, not only on the head and body, but also on the dorsal fin.

One specimen, from Balachi, had a shot (No. 2) imbedded in the isthmus, where the parts around it had healed.

Hab. Leh or Ladak, Tanksē, and fry or small ones from Lukung and Chagra (15,090 feet), all being waters directly or indirectly going to the Indus. Some fry from Sirikol, the waters of which go to the Yarkand river*, Aktash, Upper Kara-kul and Panjah, tributaries of the Oxus or Amu river. It has also been taken at Guari khorsum by Schlagintweit. Largest specimen 8·5 inches in length. There is also a specimen from Balachi, the streams there being apparently flowing towards the Yarkand river, which goes to the east.

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* I am very dubious of these specimens, and hardly think they can have been obtained from waters that flow into the Yarkand river, as the adults have not been obtained thence. The adult, however, has been taken in the Oxus; and I find by the diary that on the day the specimens in question were captured the camp was at Sirikol, a few miles from a valley where a stream enters the Aksu river, a tributary of the Oxus.

13. DIPTYCHUS MACULATUS.

Diptychus maculatus, Steindachner, Verh. z.-b. Ges. Wien, 1866, p. 787; Günther, Cat. vii. p. 171.

? *Diptychus sewerzowi*, Kessler, Fish. Turkestan, p. 17, t. 4. f. 12.

B. iv., D. $\frac{2-3}{8-9}$, P. 19, V. 9, A. $\frac{2}{5}$, C. 19, L. l. 80–90.

Length of head 5 to 6, of caudal 5 to 6, height of body 7½ to 8 in the total length. *Eyes*: diameter 4½ in the young to 6 in the adult in the length of the head, 1¼ to 2 diameters from the end of snout, and 1½ apart. The greatest width of the head equals its height, or its length behind the front edge or middle of the eyes. Mouth transverse, inferior, having an anterior sharp horny covering on the lower jaw. Lower labial fold interrupted in the middle. *Barbels*: one at each maxilla, having thick bases, and hardly so long as the eye. *Teeth* pharyngeal, 4, 3 . 3, 4, curved at the outer extremity and pointed. *Fins*: the dorsal commences rather nearer the snout than the base of the caudal, its upper edge is straight, it is as high as the body below it, its last undivided ray articulated. Pectoral not quite so long as the head; it reaches rather above halfway to the ventral, which latter commences on a vertical line below the last dorsal ray; it reaches rather above halfway to the base of the anal. Anal when laid flat reaches the base of the caudal, its height is nearly three times the length of its base. *Scales*: not imbricated, but scattered over the upper two thirds of the body and pectoral region, in which latter locality the skin is often rugose: the tiled row well developed. Free portion of the tail one half longer than high at its base. *Colours*: bluish, lightest inferiorly, indistinctly blotched and spotted along the upper half of the body, often a narrow, dull band along the lateral line, and a second below it. The dorsal and caudal much spotted in some specimens.

The very young are destitute of scales; they first appear along the lateral line. One specimen from Basgo, 1·1 inch long, has no barbel on the left side. There are two specimens from the west of Sirikol: one has an adipose lid, covering the anterior half of the left eye; the other has a similar lid covering the lower half of the left eye. Brown tubercles are common on some of the specimens, and do not appear to be normal. Some specimens from Leh have the eye small.

Diptychus sewerzowi, from the rivers Aksai and Ottuck appears to be the above species.

Hab. Specimens were brought from Kurbu, Basgo, Sneema, Leh or Ladak, Tanksē, and Chagra, from waters going directly or indirectly to the Indus; from Pas Robat (9370 feet), and Tarbashi (11,515 feet), where the waters go to the Yarkand river; also from west of Sirikol, which goes to the same river. Some specimens are also labelled as from Chiriscorus.

This fish has also been captured in other parts of Tibet, and likewise in Nepal.

14. Cirrhina gohama.

Cyprinus gohama, Ham. Buch. Fish. Ganges, pp. 346, 393.
Barbus diplochilus, Heckel, Fisch. Kasch. p. 53, t. 10. f. 1.
Tylognathus barbatulus, Heckel, Hügel's Reise, iv. p. 376.
Gonorhynchus brevis, M'Clell. Ind. Cypr. p. 373, t. 43. f. 6.
Crossocheilus gohama, Bleeker, Prod. Cypr. p. 110; Günther, Cat. vii. p. 72.
Crossocheilus rostratus, Günther, *l. c.*
Crossocheilus barbatulus, Günther, *l. c.*

B. iv., D. $\frac{3}{7-8}$, P. 15, V. 9, A. $\frac{2}{5}$, C. 19, L. l. 38–40.

There are several specimens of this fish from the lake in Cashmere; and, curiously enough, they show the links between H. B. and Heckel's species. All have a pair of rostral barbels and minute mandibular ones (*C. barbatula*). Some have $5\frac{1}{2}$, some $4\frac{1}{2}$ rows between the lateral line and base of first dorsal ray. Others possess 3, $3\frac{1}{2}$, and $4\frac{1}{2}$ rows between the lateral line and base of ventral fin. The proportions likewise vary with age and other causes.

The localities this fish inhabits, and its mode of frequenting stones, very much resemble those of *Discognathus lamta*, H.B., whilst its jaws are wide (not deep); and its under surface is similarly flattened, but it has no labial sucker.

Before describing the Loaches, I will give my reasons why it appears to me that genus *Diplophysa*, Kessler, may probably be a synonym of *Nemacheilus*.

It is said to consist of "elongated fishes, strongly compressed posteriorly," which we perceive in *Nemacheilus stoliczkæ* and *N. yarkandensis*; but in an equally elongated species, *N. tenuis*, the free portion of the tail is not compressed, but as wide as deep.

"The eyes are surrounded with a fold of skin forming a lid." This is also perceived in specimens amongst the species I have enumerated from Yarkand; and I have likewise noted that some of the other fishes from the same cold region have folds of skin more or less covering the eyes.

"Lips fleshy, the upper more or less denticulated, the inferior bilobed, and more or less papillated." I have figured the inferior surface of the head of all the Loaches; and although some, as *N. stoliczkæ* and *N. tenuis*, have the lips as described by Kessler, the *N. yarkandensis* has not, whilst the three certainly cannot be separated into distinct genera.

"Air-vessel in two parts, the anterior enclosed in a bony capsule, the posterior elongated and free in the abdominal cavity." This is the only portion of Kessler's definition not perceived in my fish; the air-vessel in all is enclosed in bone; and I cannot resist suggesting a reexamination of Western Turkestan specimens. It would be very remarkable were the *Nemacheili* found in Europe, in fact throughout Asia, even in the Oxus, to have their air-vessels enclosed in bone, whereas in the river Ili going to Lake Balkash, and the river Urdjar falling into Lake Ala (Ala kul), they have the same organ partially free in the abdomen, as is seen in genus *Botia*. But granting Kessler's description to be accurate, I cannot think that such a fact alone would justify instituting a new genus for the reception of his species.

The reason for air-vessels being enclosed in bone in some fishes is very obscure; and I sometime since adverted, in the 'Proceedings' of this Society, to the circumstance of such not being infrequent in Indian *Siluridæ*.

I found amongst the Indian genera of Siluroids of the fresh waters, or those which entered fresh waters, as follows:—

A. *Air-vessel free in the abdominal cavity.*

1. *Rita*; 2. *Erethistes*; 3. *Pseudeutropius*; 4. *Silurus*; 5. *Olyra*; 6. *Macrones*; 7. *Callichrous*; 8. *Wallago*; 9. *Arius*; 10. *Hemipimelodus**; 11. *Osteogeniosus*; 12. *Batrachocephalus*; 13. *Pangasius*; 14. *Plotosus*. Of these, five (no. 9, 10, 11, 12, and 14) are marine forms, entering fresh waters for predaceous purposes.

B. *Air-vessel more or less enclosed in bone.*

1. *Ailia*; 2. *Ailiichthys*; 3. *Sisor*; 4. *Bagarius*; 5. *Amblyceps*; 6. *Saccobranchus*; 7. *Silundia*; 8. *Eutropiichthys*; 9. *Gagata*; 10. *Pseudecheneis*; 11. *Exostoma*; 12. *Clarias*; 13. *Glyptosternum*. All of these are freshwater genera.

Thus the necessity for the air-vessel being enclosed in bone appears to be restricted to the fishes of fresh waters of the plains or hills.

These thirteen freshwater genera having the air-vessel enclosed in bone are divisible as follows:—

1. Waters of plains.
    - α. Large rivers: no suckers on the chest. *Ailia, Ailiichthys, Sisor, Bagarius, Silundia, Eutropiichthys, Gagata.*
    - β. Large rivers: descending to the sea. An accessory air-breathing apparatus. *Clarias.*
    - γ. Smaller rivers, tanks, &c. An accessory air-breathing sac. *Saccobranchus.*
2. Waters of the plains or hills.
    - No sucker on chest. *Amblyceps.*
    - Sucker on chest. *Glyptosternum.*
3. Waters of hills.
    - Sucker on chest. *Pseudecheneis.*
    - Chest adhesive. *Exostoma.*

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* I erroneously gave the air-vessel as enclosed in bone in *Hemipimelodus*. The genus was defined by Bleeker; and it was suggested that *Pimelodus cenia*, H. B., was an example. Not having an estuary or marine species, as *H. jatius*, by me, I took *P. cenia*, H. B., as one of the genus; whereas I now find that it belongs to *Gagata*, which embraces *P. cenia*, *P. viridescens*, *P. itchkeea*, and two or three other species. *Pimelodus jatius*, H. B., *has no palatine teeth*, as stated in the 'Fishes of the Ganges;' it is a *Hemipimelodus*, Bleeker; and of it I possess specimens from the Hooghly; but I consider such as probably only a variety of *Arius*.

As we find genera with the air-vessel enclosed in bone decrease in number the further we are from Hindustan proper, it is but natural to conclude that the necessity for this bony capsule is greater in India than in other tropical countries, and also that it is only useful for freshwater forms.

When we see that all fishes (except the *Nemacheili*) from Yarkand have the air-vessel free in the abdominal cavity, it stands to reason that heat or cold can scarcely be that which causes its necessity.

It is certainly remarkable that Siluroid forms do not appear to thrive in cold climates; whereas the *Cyprininæ* of this collection have all small scales, or are more or less destitute of any; whilst the Loaches of Yarkand and Tibet have none at all, neither have those recorded from the Oxus or the Jaxartes.

There is one characteristic of the hill-Loaches which seems almost invariable: the pectoral fins are stiff at their bases, as if employed for adhesive purposes. I have observed the outer ray in some of the Loaches of the plains forming a distinct bony ray with an enlarged and flattened outer extremity; but this is used for the purpose of assisting them to dig into the sand, in which they will bury themselves with great rapidity on the approach of danger.

15. NEMACHEILUS STOLICZKÆ.

Cobitis stoliczkæ, Steindachner, Verh. z.-b. Ges. Wien, 1866, p. 793, t. xiv. f. 2.

Cobitis tenuicauda, Steind. *l. c.* p. 792, t. xvii. f. 3.

Nemacheilus stoliczkæ, Günther, Cat. vii. p. 360.

Nemacheilus tenuicauda, Günther, *l. c.* p. 357.

B. iv., D. $\frac{2}{7}$, P. 13, V. 8, A. $\frac{2}{5}$, C. 15.

Length of head 6, of caudal 6, height of body 8 in the total length. *Eyes*: diameter 8 in the length of head, 3 diameters from the end of snout, and 2 apart. Snout rounded, slightly projecting over the mouth. Lips rugose; and in some specimens from Yarkand the edges are fimbriated: lower lip with a lobe on either side, but the lower labial fold interrupted in the middle. The greatest width of the head equals its height, or its length excluding the snout. In some specimens the preorbital has a free lower edge. *Barbels* six; the maxillary ones reach beyond the hind edge of the eye; the rostral ones are shorter. *Fins*: the dorsal commences midway between the eye and the base of the caudal, it is one third higher than its base is long, and equals the greatest depth of the body; its last ray is divided to its base; its upper edge is oblique, with a rounded anterior angle. Pectoral nearly as long as the head, and reaching rather above halfway to the ventral; the latter fin arises on a vertical line below the anterior dorsal rays, is almost as long as the pectoral, and reaches above halfway to the anal. Anal with a very narrow base. Caudal slightly emarginate. Free portion of the tail from twice to two and a half times as long as high at its base. *Scales* absent. *Air-vessel* in two portions, enclosed in bone.

Colours: greyish along the back, becoming lighter beneath, marbled all over with dark green or black spots or bands. Dorsal, caudal, and sometimes outer pectoral rays barred.

In specimens from Sirikol the snout is rather more pointed than described above.

Hab. Leh or Ladak (11,538 feet); Sneema, Lukung stream (14,130 feet); and Chagra (15,000 feet), all being waters directly or indirectly going to the Indus. Also Yarkand (3923 feet) and Sirikol, where the waters go to the easterly or Yarkand river; and Aktash (12,600 feet), which is on the Aksi, a tributary of the Oxus.

I have a specimen in my collection given me by Dr. Stoliczka; he procured it, along with those sent to Steindachner, from Lake Tsumureri in Rupsbu (Tibet), on his first visit to that country.

16. NEMACHEILUS YARKANDENSIS, sp. nov.

B. iv., D. $\frac{2}{7}$, P. 17, V. 8, A. $\frac{2}{5}$, C. 15.

Length of head 4$\frac{1}{3}$, of caudal 6, height of body 6$\frac{3}{4}$ in the total length. *Eyes*: diameter 6 to 7 in the length of the head, 2$\frac{1}{2}$ diameters from the end of snout, and 2 to 3 apart. Snout rather elevated in the adult: upper surface of the head nearly flat; its greatest width equals its height or its length excluding the snout. Mouth inferior, horseshoe-shaped; lips smooth, lower labial fold interrupted in the middle and destitute of lobes. *Barbels* six; the maxillary ones reach (in adults) the angle of the preopercle. *Fins*: the dorsal commences midway between the front edge of the eye and the base of the caudal fin; its upper edge is straight and oblique; its height rather exceeds that of the body below it, and is one fourth more than the extent of its base. Pectoral as long as the head excluding the snout, and reaching two thirds of the distance to the ventral. Ventral commences below the first dorsal ray, is shorter than the pectoral, and reaches two thirds of the distance to the anal. Anal twice as high as wide at its base. Caudal emarginate, its outer rays being a little produced. Free portion of the tail at its commencement nearly equals its length in the adult, but is less in the young. *Scales* absent. *Air-vessel* in two portions, enclosed in bone. *Colours*: greyish, having in some specimens numerous fine blackish or dark spots on the body. In some there is a silvery lateral band.

Hab. Yarkand, Pas Robat, Yankihissar, and Kashgar, all from waters in connexion with the Yarkand and Yankihissar or Great Easterly River.

17. NEMACHEILUS TENUIS, sp. nov.

B. iv., D. $\frac{2}{8\text{-}9}$, P. 13, V. 8, A. $\frac{2}{5}$, C. 17.

Length of head 5$\frac{1}{3}$ to 5$\frac{1}{2}$, of caudal 7$\frac{1}{2}$, height of body 9 to 10 in the total length. *Eyes*: diameter 5$\frac{1}{2}$ in the length of head, 2$\frac{1}{4}$ diameters from the end of snout, and 1 apart. Snout rather compressed and overhanging the mouth; the greatest width of the head equals its height or its length excluding the snout. In some specimens the lower edge of the preorbital is free. Lips thickened and fimbriated in the adult; lower labial fold interrupted in the middle, and rather lobed on either side. *Barbels* six; the outer rostral pair extend to below the hind edge of the eye, the maxillary ones to the opercle in the adult. *Fins*: dorsal commences midway between the end of the snout and the base of the caudal fin; its upper edge is slightly concave, with a rounded upper angle; it is rather more than one half higher than the extent of its base or than the body below it. Pectoral nearly as long as the head, and reaches rather above halfway to the ventral, which latter commences under the third dorsal ray; is as long as the pectoral, and reaches the base of the anal. Anal twice as high as wide at its base. Caudal slightly emarginate. Free portion of the tail one third as high at its base as it is long, whilst its breadth equals its height. *Scales* absent. *Air-vessel* in two portions, enclosed in bone. *Colours*: yellowish white, its upper surface and sides sometimes with dark blotches and spots; dorsal and caudal with dull spots.

This fish is allied to *N. ladacensis*, Günther, but is distinguished by a more elongated body and longer barbels &c.

Hab. Aktash (12,600 feet elevation), where the waters of the Ak-su pass to the Oxus; and Yankihissar (4320 feet elevation), where the rivers go to the Yarkand river.

18. NEMACHEILUS LADACENSIS.

Nemacheilus ladacensis, Günther, Cat. vii. p. 356.

B. iv., D. $\frac{2}{8}$, P. 13, V. 9, A. $\frac{2}{6}$, C. 19.

Length of head 5, of caudal $5\frac{3}{4}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*: diameter 5 to $5\frac{1}{2}$ in the length of head, $2\frac{1}{2}$ diameters from end of snout, and 2 apart. Greatest width of head equals its height or its length excluding the snout. Lips moderately thick and rugose; lower labial fold interrupted in the middle. *Barbels* six; the maxillary ones scarcely reach to below the front edge of the eye, the longest rostral ones to below the front nostril. *Fins*: dorsal commences midway between the front edge of the eye and the base of the caudal fin; it is as high as the body below it and half higher than its base is long; its upper anterior corner rounded. Pectoral as long as the head behind the angle of the mouth, and reaching nearly to the ventral, which latter fin arises below the commencement of the dorsal fin; it is shorter than the pectoral, but extends to the base of the anal. Anal twice as high as long, and reaches above halfway to the base of the caudal, which is emarginate. Free portion of the tail twice as long as high at its base. *Scales* absent. *Colours*: of a light fawn, with sixteen or eighteen interrupted darker and sinuous bands passing from the back down the sides; a silvery lateral band. Dorsal and caudal finely spotted in lines; a darkish band on pectoral, ventral, and anal.

Hab. Gnari Khorsum, Tibet. The specimen described is the largest of two obtained by Messrs. v. Schlaginweit, and deposited in the Indian Museum. The size of the British-Museum specimen, and the broken state of its caudal fin, must be accepted as the reason why my proportion of the free portion of the tail does not agree with Dr. Günther's (nearly $\frac{1}{4}$); whilst I find the caudal fin emarginate, and not "rounded."

19. Nemacheilus gracilis, sp. nov.

B. iv., D. $\frac{2}{7}$, P. 13, V. 8, A. $\frac{2}{6}$, C. 17.

Length of head $5\frac{1}{2}$, of caudal $6\frac{1}{3}$, height of body $6\frac{1}{3}$ in the total length. *Eyes*: diameter 11 in length of head, 4 diameters from end of snout, and $2\frac{1}{2}$ apart. Snout overhanging the mouth. The greatest width of the head equals its height or its length excluding the snout. Lips thickened; lower labial fold interrupted in the middle and rather lobed on either side. *Barbels* six; the maxillary ones nearly twice as long as the eye; the external rostral ones reach the hind nostril; the other pair are shorter. *Fins*: dorsal commences midway between the eye and vertical border of the preopercle; its upper edge is nearly straight; it is not quite so high as the body below it, and one fourth less than the extent of its base. Pectoral as long as the head behind the angle of the mouth; it reaches rather above halfway to the base of the ventral, which latter fin arises somewhat in advance of the commencement of the dorsal; it is of about the same length as the pectoral, and extends halfway to the anal. Anal twice as high as wide at its base; it reaches, when laid flat, a little more than halfway to the base of the caudal, which is slightly emarginate. Free portion of the tail half as high at its base as it is long. *Scales* absent. *Colours*: brownish along the back, becoming yellowish beneath; dorsal and caudal with dull spots.

Hab. Basgo, on the head-waters of the Indus.

20. Nemacheilus marmoratus.

Cobitis marmorata, Heckel, Fische Kasch. p. 76, t. xii. figs. 1 & 2; Hügel, Kaschm. iv. p. 380.

Cobitis vittata, Heckel, *l. c.* p. 80, t. xii. figs. 3 & 4; Hügel, *l. c.* p. 382.

Nemachilus marmoratus, Günther, Cat. vii. p. 356.

B. iv., D. $\frac{2}{7}$, P. 11, V. 7, A. $\frac{2}{5}$, C. 17.

Length of head $4\frac{3}{4}$ to 5, of caudal 7, height of body 7 in the total length. *Eyes*: diameter 5 in length of head, 2 diameters from end of snout, and $1\frac{1}{2}$ apart. Snout somewhat pointed; and in some the preorbital is slightly projecting. Lips wrinkled; the lower labial fold interrupted. The greatest width of the head equals its height or its length excluding the snout. *Barbels*: the maxillary ones reach to below the hind edge of the eye; the rostral ones are nearly as long. *Fins*: dorsal commences midway between the end of the snout and the base of the caudal; its upper edge is nearly straight, oblique, and with rounded angles; its height rather exceeds that of the body below it; and it is nearly twice as high as its base is long. Pectoral as long as the head excluding the snout, and extending halfway to the ventral. Ventral one third shorter than the pectoral, and reaching halfway to the anal. Anal twice as high as long at its base. Caudal cut square, with rounded angles or slightly emarginate. Free portion of the tail from one and a half to twice as long as high at its base. *Scales* absent. *Colours*: marbled or irregularly blotched and spotted with brown; fins also more or less spotted.

Hab. Cashmere Lake.

21. NEMACHEILUS RUPICOLA.

Schistura rupicola, M'Clelland, Journ. Asiat. Soc. of Beng. vii. pl. 55. fig. 3, and Ind. Cypr. p. 309, pl. 57. f. 3.

The Cashmere species are almost or quite destitute of scales, and otherwise agree with M'Clelland's fish.

It may, however, be questionable whether *N. montana*, M'Clelland, and some other recognized species are not merely varieties of one form, as the variations in one locality and also changes with age are very great.

NEMACHEILUS MICROPS[*].

Cobitis microps, Steind. Verh. z.-b. Ges. Wien, 1866, p. 794, t. xiii. f. 3.

Nemacheilus microps, Günther, Cat. vii. p. 357.

This species is entirely destitute of scales. It was obtained by Dr. Stoliczka in Tibet, on his first journey; but no specimens exist amongst the Yarkand collection.

If we examine the localities whence the fishes which form this collection were procured, omitting the Cashmere examples, we find as follows:—

Name of species.	Head-waters of Indus.	Yarkand river, or its branches.	Oxus, or its tributaries.
Exostoma stoliczkæ	1		
Oreinus sinuatus	1		
Schizothorax esocinus	1		
—— *chrysochlorus*	...	1	
—— *intermedius*	...	1	1
—— *irregularis*	...	1	
Ptychobarbus conirostris	1		
—— *laticeps*	...	1	
—— *longiceps*	...	1	
Schizopygopsis stoliczkæ	1	...	1
Diptychus maculatus	1	1	
Nemacheilus stoliczkæ	1	1	1
—— *gracilis*	1		
—— *yarkandensis*	...	1	
—— *tenuis*	...	1	1
Totals	8	9	4

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[*] *Oreias dabryi*, Sauvage, Rev. et Mag. Zool. 1874, p. 3, is closely allied to this species.

Thus we have:—eight species from the head-waters of the *Indus*, two of which extend to the Great Easterly or Yarkand river of Eastern Turkestan, and one to the Oxus of Western Turkestan; nine species from the *Yarkand river*, two common to the Indus and three to the Oxus; four species from the *Oxus*, three of which are also found in the Yarkand river, and one in the head-waters of the Indus.

The foregoing species constitute the fish-collection made in the cold and inhospitable regions traversed by the Mission; and they are of interest for the purpose of ascertaining what are the chief characteristics of the fish-fauna, and what relationship it bears to those of contiguous Asiatic regions, so far as such have been ascertained.

In this inquiry it will be necessary to take a survey of the fishes of Afghanistan, Western Turkestan, and Hindustan, before proceeding further respecting those of Tibet and Yarkand or Eastern Turkestan.

Most of our knowledge of the Fishes of Afghanistan is due to the labours of Griffith, who remarked:—"The characteristic forms of Afghan fish are doubtless the small-scaled *Barbi* and *Oreini*; and these far exceed the others in number . . . . The fish are as distinct from the Indian forms as the plants are . . . . By characteristic I do not mean that these forms are limited to Afghanistan, because they occur perhaps to an equal extent in the Himalayas, to the streams of which those of Afghanistan approximate more or less in the common features of rapids and bouldery beds."

Having crossed the high range of mountains separating Afghanistan from the plains of Western Turkestan, he found "a great change in the fish to occur, and *Salmonidæ* seem to take the precedence of the *Cyprinidæ*. A species of Trout abounds in the Bamean river and up its small tributaries, derived from the Koh-i-Baba, to an altitude of about 11,000 feet. A species of *Barbus* with small scales is likewise common in the Bamean river" (Calc. Journ. Nat. Hist. ii. p. 565).

He observes that Indian species were in the majority in the Cabul river (a tributary of the Indus) at Peshawur; and in accordance with the facility or the reverse of access from the plains did he find a predominance of Indian or Afghan forms *.

The nature of the fishes of Afghanistan appears to be much as follows:—Absence of Acanthopterygian or spiny-rayed families, except the spineless and widely distributed *Ophiocephalus gachua*, Ham. Buch., and the spined eel, *Mastacembelus armatus*, Lacép., so common in the East from the plains to the summits of mountains. Few Siluroids, but perhaps a *Callichrous* and *Amblyceps*. Numerous Cyprinoids which appear to belong to the following genera—*Orei-*

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* Griffith states that the Cabul river at Jellalabad presents us with two or three small-scaled *Barbi* (? *Schizothorax*) and *Oreini*, together with certain tropical forms, as the Mahasir (*Barbus*) and a *Silurus* very like, if not identical with, the Poftah (*Callichrous*). Also the same river at Lalpore possesses a fish, I believe, identical with the Nepoora of Assam (*Labeo*), and a *Gonorrhynchus* (=*Discognathus*). Griffith also mentions a Loach-like *Silurus* from near Jubraiz (? *Amblyceps*).

nus, Schizothorax, Bungia from near Herat, *Barilius*, and a Loach (? *Nemacheilus*), perhaps *Discognathus* and *Barbus*.

The fullest account we possess of the fishes of Western Turkestan is that lately given by Kessler, from which I have extracted the following:—

ACANTHOPTERYGII. *Perca fluviatilis*, Linn., obtained exclusively from the Jaxartes and some of its tributaries. *P. schrenckii*, Kess., from Lake Balkash. *Lucioperca sandra*, Cuv., from the Jaxartes. *Cottus spinulosus*, Kess., very rare in Turkestan, two specimens from Khojend.

None of these spiny-rayed fishes were captured at so south a latitude as Kashgar. Out of the four species three came from the Jaxartes or its tributaries, the other from lake Balkash.

SILURIDÆ. *Siluris glanis*, Linn. Generally spread throughout Western Turkestan, having been received from the Jaxartes, Oxus, and Sarekshan or Tarafshan rivers.

CYPRINIDÆ. *Cyprinus carpio*, Linn., from the Jaxartes, Oxus, Sarekshan rivers. *Barbus conocephalus*, Kess., from Sarekshan. *B. platyrostris*, Kess., from the river Aksu falling into lake Balkash. *B. lacertoides*, Kess., from Jaxartes and its tributaries. *B. brachycephalus*, Kess., from Jaxartes and Oxus. *Schizothorax aksaiensis*, from the river Aksai. *S. fedtschenkoi*, Kess., *S. affinis*, Kess., and *S. eurystomus*, Kess., from the Sarekshan river. *S. orientalis*, Kess., from a lake on the Alatau mountains, the waters on the Western Turkestan side of which drain to Lake Balkash. *Diptychus severzowi*, Kess., Aksai and Ottuk rivers to 10,000′. *D. dybowskii*, Kess., river Aksu. *Gobio fluviatilis*, Cuv., widely distributed in Western Turkestan, specimens received from near the towns of Tachkent, Khojend, Djisak, and the river Ak Daria. *Abramis brama*, Linn., Jaxartes and its tributaries. *A. sapa*, Pallas, rare, from the Jaxartes. *Acanthobrama kuschakewitschi*, Kess., Jaxartes. *Pelecus cultratus*, Linn., Sea of Aral. *Abramis chalcoides*, Güld., rather rare, obtained in the Ak Daria and Durman cul. *A. iblioides*, Kess., creeks near Jani curjan. *A. fasciatus*, Nord., Sarekshan. *A. tæniatus*, Kess., Jaxartes. *Aspius rapax*, Pallas, Jaxartes and its tributaries. *A. esocinus*, Kess., Jaxartes and Oxus. *Leuciscus erythrophthalmus*, Linn., Jaxartes. *L. squaliusculus*, Kess., from near Khojend on the Jaxartes and Janykurjan. *L. rutilus*, Linn., Jaxartes and Aigus Lake.

COBITIDINÆ. *Cobitis longicauda*, Kess. (scaled), one specimen from the Jaxartes. *C. uranoscopus*, Kess., from near Magian, Tashkend, Hhodjaduk, and Lake Iskander, the waters of which appear to drain to the Sarekshan river. *C. dorsalis*, Kess., creeks near Janykurjan. *C. elegans*, Kess., and *C. tænia*, Kess., river near Tashkend, a tributary of the Jaxartes. *Diplophysa strauchii*, Kess., river Ili, falling into Lake Balkash. *D. labiata*, Kess., river Urdjar, falling into Lake Alakul.

SALMONIDÆ. *Salmo oxianus*, Kess., river Darant, falling into the Kisil-su, one of the upper tributaries of the Oxus.

ESOCIDÆ. *Esox lucius*, Linn., Jaxartes and its tributaries.

CHONDROPTERYGII. *Acipenser schipa*, Lovetsky, Jaxartes, Casalius river. *Scaphirhynchus fedtschenkoi*, Kess., Oxus.

The foregoing fishes of Western Turkestan * mainly consist of, first, those descending from the north or spreading from the east or west, such as *Perca, Lucioperca, Cottus, Gobio, Abramis, Acanthobrama, Pelecus, Alburnus, Aspius, Squalius, Leuciscus, Acipenser*, and *Scaphirhynchus.*

Secondly, those common to Afghanistan and Yarkand, as *Schizothorax*, *Barbus*, Loaches (? genus).

Thirdly, those found also in Yarkand, as *Schizothorax* and *Diptychus.*

Fourthly, *Silurus* (which will be alluded to).

Lastly, *Salmo*, on the slopes of the mountains where the rivers descend to the Oxus.

The existence of one of the Salmonidæ, termed *Salmo orientalis* by M'Clelland, was well known to Dr. Stoliczka; and an especial object of his search (as he informed me previous to starting) would be to try and ascertain what its distribution was. Griffith found this fish "in the Bamean river, a stream that falls from the northern declivities of the Hindoo Koosh into the Oxus."

Kessler does not record any of this family from the Jaxartes, or, in fact, from the rivers immediately descending from the Tian Shan or the Alatau Mountains. We are therefore left to surmise that in the hills whence these fishes were taken is the abrupt termination of members of the family Salmonidæ, which does not possess a solitary representative in Hindustan, except the *S. levenensis* (introduced on the Neilgherries in Madras).

If we now take a short review of the *Freshwater Fishes of India*, we find much as follows:—

ACANTHOPTERYGII.

Genera *Ambassis, Badis, Nandus, Pristolepis, Sciæna, Gobius* and some allied genera, *Rhynchobdella, Mugil, Anabas, Polyacanthus, Osphromenus, Trichogaster, Etroplus* exist in India, but are absent from the fresh waters of Afghanistan, Turkestan and Yarkand. Whether existing only in large rivers or distributed more generally over India, none pass the boundary of the Himalayas.

Mastacembelus and *Ophiocephalus* are found in India and also in Afghanistan; both also ascend for some height the Himalayas and other hill-ranges.

PHYSOSTOMI.

SILURIDÆ. Genera *Erethistes, Macrones, Rita, Pangasius, Pseud-*

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* I have to thank Mr. F. Carl Craemers for kindly translating some Russian localities, which I should not otherwise have been able to give.

eutropius, Wallago, Olyra, Chaca, Clarias, Saccobranchus, Silundia, Ailia, Ailiichthys, Eutropiichthys, Sisor, Gagata, Bagarius, Pseudecheneis, Glyptosternum exist in India, but not in Afghanistan, Turkestan, or Yarkand.

Callichrous and *Amblyceps*, which are found in India, appear to be present in Afghanistan, and the former also in Cashmere.

Exostoma is found along the Himalayas; *Silurus* in Turkestan and India.

CYPRINODONTIDÆ. *Cyprinodon* and *Haplochilus* are found in India.

CYPRINIDÆ. Genera *Psilorhynchus, Cirrhina, Amblypharyngodon, Nuria, Rasbora, Aspidoparia, Rohtee, Perilampus, Chela, Homaloptera,* and various genera of Cobitidinæ exist in India.

Discognathus, Labeo, and *Barilius* are common to India and Afghanistan, but are evidently Indian forms.

Oreinus, Schizothorax, and *Barbus* are found in India, also in Afghanistan, and the two last in Turkestan, whilst *Schizothorax* is common in Yarkand. *Cobitis* or *Nemacheilus* seem to extend everywhere.

CLUPEIDÆ and NOTOPTERIDÆ. Of the genera belonging to these families, and which exist in the fresh waters of India, none go beyond the base of the Himalayas.

The *fishes of Yarkand** consist of species of the following genera:—*Schizothorax*, found also in Afghanistan and Turkestan; one species on the slopes of the Himalayas, and sometimes even descending to the plains. *Diptychus*, Tibet, Yarkand, and Turkestan. *Schizopygopsis*, Tibet and Yarkand. *Ptychobarbus*, Tibet and Yarkand. The remainder are Loaches.

Diptychus dybowskii, Kess., would almost seem to be a *Schizopygopsis* with an articulated dorsal ray and a pair of maxillary barbels. Perhaps several of these hill-genera will, at some future date, be properly amalgamated, as has been done with the low-country Barbels (*Barbus*).

An examination of the genera of spiny-rayed or Acanthopterygian fishes clearly shows that, as we proceed inland in India they diminish, at the Himalayas they cease. Two Indian species † only have been observed to exist in Afghanistan; and they are amongst the most widely distributed of their respective genera. Neither of these extends in the N.E. either to Turkestan or Yarkand. In Turkestan, it is true, three genera of this order are represented; but they have evidently extended southwards. Yarkand and Tibet appear to be unsuited for this Order of fishes; and thence none have been brought.

The Physostomi include all the Yarkand and Tibet fishes.

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* I here omit the genera *Exostoma* from the Himalayas and *Oreinus* from the Himalayas and Afghanistan.

† *Ophiocephalus gachua* and *Mastacembelus armatus*.

Among Siluroids the Indian genera *Callichrous* and ? *Amblyceps* have been doubtfully recorded from Afghanistan; but neither have spread to Turkestan, where, however, the *Silurus glanis* is found, evidently a wanderer from its more northern home.

It is clear that in India there is a gradual diminution of Siluroids as we proceed inland until we arrive at the Himalayas. On the slopes of these mountains we at first obtain a few peculiar genera and species organized for a mountain-torrent life; but as we rise, eventually (as was the case in this Mission) an elevation is attained which, taken in connexion with the latitude and paucity of food, seems to be beyond the limit of the Indian Siluroids.

The Siluroids along the slopes of the Himalayas appear to be mostly confined to the following:—A few, as *Macrones* and *Callichrous*, ascend a short distance; but this may be considered accidental. *Pseudecheneis* is a more distinct hill-form, possessing a sucker formed of transverse folds between its pectorals on the chest, and by the aid of which it prevents itself being carried away by the torrents. *Glyptosternum* has also an adhesive sucker, but of longitudinal folds, and likewise placed on the chest. These fishes, however, appear to be more intended for rapid rivers in the plains; but some ascend the slopes of the Himalayas. I have taken *large specimens* from the rivers at the base of the hills in which the suckers were scarcely visible: whether they had outgrown them, or, owing to the suckers not having been primarily well developed, they had been unable to maintain their footing in the hill-streams, of course, one cannot decide. *Amblyceps* is a Loach-like form found in the waters of the plains and also of the hills; it is abundant near Kangra. *Exostoma*, an example of which exists in the Yarkand-Mission collection, is also a remarkable form. It has a broad and depressed head and chest, the latter forming a species of sucker to enable it to sustain a mountain-torrent life.

This fish (*Exostoma stoliczkæ*) belongs to a genus which has only been recorded from hilly regions, neither extending to the waters of the comparatively levels of the high lands, nor descending any distance towards the plains. The following six species are known:—1. *E. stoliczkæ*, from the head-waters of the Indus; 2. *E. blythii*, from near Darjeeling, where the waters descend to the Ganges; 3. *E. labiatum*, from the Mishmi Mountains and Eastern Assam. 4. *E. andersonii*, from near Bhamo on the confines of China; 5. *E. davidi*, from the most easterly portion of Tibet near the head-waters of the Yang-se-kiang; 6. *E. berdmorei*, from Tenasserim.

The distribution of the foregoing six species of this genus is interesting, because it is suggestive of whether at some remote period the Himalayan range, the mountains between Tibet and China, and the spur or continuation southwards through Burma and Siam, may not have been connected one with another.

Whilst adverting to this point, I would mention another circumstance: the only Siluroid stated to be found in Turkestan is the *Silurus glanis*, Linn. Three other species of the same genus have been captured on the hill-ranges of India; and their distribution somewhat accords with that of *Exostoma*.

1. *Silurus cochinchinensis*, Cuv. & Val. = *Silurichthys berdmorei*, Blyth, and (2) *Silurus wynaadensis*, Day. These fishes, found in hills up to about 2500 feet, have been obtained in the western ghauts, Akyab hills, Tenasserim, and Cochin China. They would appear to be restricted to those mountains which are not far removed from the sea-coast. How it is that several species of fishes are common to Malabar and Siam, or the countries contiguous to it, whilst they are entirely absent from the intermediate districts of India, is a question which I do not propose entering upon.

3. *S. dukai*, Day, is from Darjeeling.

Cyprinidæ form the entire collection of the Yarkand Mission, after its arrival beyond the head-waters of the Indus. If we examine the members of this family found on the Himalayas in the same manner as we have the Siluroids, we find as follows:—*Discognathus*, so recognizable by the sucker on the lower lip, is found some distance up the mountains, but is rare above 5000 feet. *Oreinus*[*], with its small scales, broad mouth, and likewise a sucker behind the lower jaw, becomes more and more common the higher we ascend. The expedition obtained one species at Leh or Ladak, the head-waters of the Indus; and it has been found as a genus extending from Afghanistan along the Himalayan range, and near Bhamo by the last Yunnan Mission, or the same district as the Siluroid genera *Exostoma* and *Silurus*. It appears to essentially prefer the sides of hills and impetuous torrents.

Some of the stronger Labeos, Barbels (*Barbus*), and a *Barilius* are found here and there on the slopes and in the side streams of the Himalayas up to very considerable heights. They, however, are of Indian forms which, if able to do so, appear to migrate during the breeding-season to the mountains to deposit their ova in the side streams which are unreplenished by snow-water. Here the fry are often compelled to remain until the succeeding year's rains swell the waters, washing food into their retreats to enable them to grow, or else to permit them to descend to the plains.

Once near the summit of these mountains, and beyond districts where adhesive suckers are a necessity for moderate-sized fishes to possess to prevent their being washed away, we come upon genera as rare in the plains of India as are the Indian forms at the summit of the Himalayas.

Cashmere is a locality traversed by this Mission, a hilly Himalayan district, and one which it is necessary to refer to. In Hügel and Heckel's 'Fische aus Kaschmir" we find the following species recorded:—

Oreinus plagiostomus, Heckel; *O. sinuatus*, Heck.; *Schizothorax curvifrons*, Heck.; *S. longipinnis*, Heck.; *S. niger*, Heck.; *S. nasus*, Heck.; *S. huegelii*, Heck.; *S. micropogon*, Heck.; *S. planifrons*, Heck.; *S. esocinus*, Heck.; *Cirrhina gohama*, Ham. Buch.; *Barbus*

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[*] This belongs to a group characterized, amongst other things, by a row of tiled scales along the base of the anal fin, and enclosing the excretory outlets.

tor, H. Buch.; *Labeo varicorhinus*, Heck.; *Nemacheilus marmoratus*, Heck.; *Callichrous lamghur*, Heck.

These fishes demonstrate relationship with three districts:—*Schizothorax* with Afghanistan and East and West Turkestan; *Oreinus* with the slopes of the Himalayas in their whole extent; *Cirrhina*, *Barbus*, and *Callichrous* with the neighbouring fauna of Hindustan.

Having examined what are the ingredient parts of the fish-fauna of Western Turkestan, Afghanistan, Hindustan, Yarkand, Tibet, and Cashmere, it will be interesting to endeavour to discover if these localities are possessed of any indigenous forms, and, if so, how far they extend into contiguous countries.

I do not propose inquiring into whether the great desert region of Central Asia can or cannot be included in one Tartarian subregion; but, as the zoology of this portion of the globe is at present rather obscure, I think it will be more useful to limit one's self strictly to ascertained facts.

Dr. Sclater observes (Address, Biological Section, British Association, 1875) that Mr. Forsyth's embassy "to Yarkand has led naturalists into the fringe of the Tartar subregion." I would, however, suggest, in an ichthyological point of view, whether the Russian investigators have not been more on the outskirts of a peculiar region of which Yarkand may be the centre; for certainly it is richer in forms of *Schizothoracinæ* than Western Turkestan appears to be.

In the cold and hilly districts of Tibet and Yarkand we observe an absence of spiny-rayed and Siluroid fishes; whilst amongst Carps we see the genera *Schizothorax*, *Ptychobarbus*, *Schizopygopsis*, and *Diptychus*—fishes belonging to a peculiar division of Carps (*Schizothoracinæ*, or Hill-Barbels), which may be thus defined:—

Carps *more or less covered with minute scales, or destitute of any. A membranous sac or slit anterior to the anal fin, which is laterally bounded by a row of vertically placed scales, like eave-tiles, and which are continued along the base of the anal fin.*

The fishes composing this are mostly of an elongated form, and are divisible into:—

α. Those with transverse mouths, as *Oreinus*, *Ptychobarbus*, *Schizopygopsis*, *Diptychus*.

β. Those with compressed mouths, as *Schizothorax*.

The genus *Oreinus* is spread from the Helmund river and Jellalabad in Afghanistan, along the whole Himalayan and contiguous ranges of hills to at least the confines of China. So far as I know, these fishes appear to be strictly residents of rivers in hilly regions, neither descending far into those of the plains nor found on the level plateaux on the summits of the mountains. This accounts for their absence from the Yarkand collection; and from the foregoing extracts it appears probable that they are not found to the north of the Oxus. This genus appears to be on the outskirts of the rest of its group; and its mouth armed with a sucker, to resist its being washed away, makes it well able to sustain a mountain-torrent life.

The other genera are more or less spread in the following districts. From the Helmund river and the eastern portion of Afghanistan, the upper parts of the Oxus, and the eastern portion of Western Turkestan, the Tian Shan or Celestial mountains, and also the Alatau mountains more to the south, they extend along the Himalayan region, certainly as far as the most easterly part of Assam.

These fishes (*Schizothoracinæ*) are confined to cold regions, as a rule, or at least to localities possessing snow-fed rivers, many of which rivers end in lakes and do not go to the sea. They extend from Eastern Afghanistan and Western Turkestan through Tibet, and the most westerly portion of China, along the Himalayas to the hills in the Yunnan direction.

Loaches (*Nemacheilus*) are likewise generally distributed; and it is remarkable, as I have already observed, that all are scaleless. The same appears the rule in Western Turkestan.

The conclusion, I think, we may fairly arrive at, after examining the fishes of Yarkand and the adjoining countries is, that we find a peculiar group of Carps (*Schizothoracinæ*) which has spread almost due east and west from the cold and elevated regions of Eastern Turkestan, but of which the southern progress has been barred by the Himalayas.

If we look to the south we see, as it were, that a wave of tropical forms of fishes has, at a prehistoric period, expanded over that portion of the globe where the Nicobars, Andamans, and the most southern portions of the continent of Asia now are, that this fish-fauna has its northward progress arrested by some cause at or near where the Himalayas now exist and mark the division between the fish-fauna of India and that of Turkestan.

3. Description of new Genera and Species of Phytophagous Coleoptera. By Martin Jacoby.

[Received November 20, 1876.]

Family Crioceridæ.

Genus Crioceris, Geoffroy.

1. Crioceris australis, sp. nov.

Oblong, fulvous, fuscous below; head a little darker-coloured than the elytra, finely golden pubescent at its lower half, impunctate at the remainder, convex between the eyes, the frontal oblique grooves feebly impressed and a distinct transverse depression above them; antennæ scarcely half the length of the body, entirely black, with rather short cylindrical joints, the second of which is the shortest, the fifth the longest; thorax coloured as the head, subquadrate, with its anterior half greatly widened, deeply but not largely constricted behind its middle and transversely grooved near the base, smooth and shining; elytra much wider than the thorax, a little constricted before the middle, of a light fulvous colour, scarcely impressed below the base, with only four or five partly interrupted punctured striæ, of which the first, in shape of an impressed groove, runs parallel with the suture, while the last is only distinctly visible till about the middle of the elytra, the rest of the surface entirely impunctate, and the lateral margin strongly sulcate through its entire length; body beneath dark fuscous, the abdominal segments margined with lighter brown, legs black, the whole covered with golden pubescence.

Length 4 lines.

Hab. Australia.

Although this species seems closely allied to *C. obliterata*, Baly, by the obliterated striæ on the elytra, it differs in other particulars sufficiently to justify its classification as another species.

C. obliterata is excavated between the eyes, while in this species this space is *convex*, and the antennæ *entirely* black and *shorter* than half the body; the deep impressions near the lateral border in *C. obliterata* are here also entirely wanting.

Two specimens are contained in my collection.

Genus LEMA.

2. LEMA PURPURASCENS, sp. nov.

Elongate, subparallel, subdepressed, shining fulvous, with a purplish hue; head with the front obliquely grooved on each side, covered on the face with yellowish pubescence; labrum, apex of jaws, and eyes black; antennæ half the length of the body, with the second joint half the length of the third, the fourth scarcely longer than the preceding one, the rest elongate, cylindrical, black, with the exception of the first four joints, which are fulvous; thorax with the sides deeply constricted in the middle, and a strongly marked transverse depression near the base, two shallow foveæ are also visible on the disk near the lateral depression, surface shining, smooth, with a few punctures near the anterior margin and two longitudinal lines of punctured striæ in the middle; elytra much wider than the thorax, transversely depressed below the shoulder, and constricted longitudinally from the shoulder at the lateral margin towards the middle, each elytron with 10 rows of strong punctures, the first very short; near the apex the punctuation is much deeper, and the intervals assume the form of raised costæ; underside and legs slightly lighter than the upperside, tarsi fuscous.

Length $4\frac{1}{2}$ lines.

Hab. Madagascar.

Family MEGALOPODINÆ, Lac.

Genus AGATHOMERUS, Lac.

3. AGATHOMERUS DUBIOSUS, sp. nov.

Oblong, fulvous ferruginous above, black beneath. This species agrees in size, shape, and coloration above entirely with *A. rufus*, Lac., but differs in the following particulars : in *rufus* the entire underside and legs are testaceous, with the exception of a few black spots on the abdomen, while in *dubiosus* these parts are shining black, with the exception of the tibiæ and tarsi, which are ferruginous ; in *rufus* the scutellum is of the same colour as the body, while in *dubiosus* it is entirely black ; and although this species may only be a variety of *rufus*, I find no mention made of it in Lacordaire's description.

Two specimens from Mexico in my collection.

Family CLYTHRINÆ, Lac.

Genus MEGALOSTOMIS, Lac.

4. MEGALOSTOMIS BASILARIS, sp. nov.

Short, ovate, subdepressed, flavous, sparingly pubescent above, strongly beneath. Head black, pubescent, shining, closely punctate, striated near the eyes, leaving only a narrow space in the middle of the vertex smooth, two large depressions divided by a raised middle line in front of the eyes, the latter light-coloured. Antennæ dentate from the fifth joint, reaching to the base of the thorax. Posterior angles of thorax indistinct, anterior ones produced, the sides widened from before the middle towards the base, rounded, the median lobe at the base largely rounded ; the entire surface closely punctured and covered with whitish pubescence, sparingly on the disk, closely near the sides ; two large red spots occupy almost the entire sides, but are partially covered with hairs, and therefore only plainly visible near the base, where the pubescence is less dense. Elytra a little wider at the base than the thorax, closely and confusedly punctate, a little finer near the apex, the punctures showing a tendency to arrange themselves in striæ near the suture ; the whole surface sparingly covered with stiff whitish hair ; exactly on the shoulder of each elytron is a round black spot, the extreme base of the elytra, as well as the sutural line, is also narrowly edged with black. Entire underside reddish, densely covered with white pubescence ; femora and tarsi black ; tibiæ testaceous.

Length 4 lines.

Hab. Peru.

A single specimen in my collection.

5. MEGALOSTOMIS AMAZONA, sp. nov.

Ovate, of same shape as *basilaris*, light brownish above, finely pubescent, beneath thickly clothed with yellowish hair ; head divided in the middle by a longitudinal raised line, closely punctured and pubescent, posterior margin of epistome dentate, anterior emarginate in middle ; jaws and antennæ black, eyes brown ; thorax shaped exactly as in the preceding species, densely covered with golden yellow hair, which also extends to the scutellum ; elytra about two and a half times the length of the thorax, reddish brown, finely but closely pubescent, the base, a narrow transverse band in the middle, and a round spot near the apex black.

Length 4 lines.

Hab. Amazons.

Two specimens in my collection.

Genus SAXINIS, Lac.

6. SAXINIS PROPINQUA, n. sp.

Oblong, parallel, shining violet-blue, beneath moderately covered with short whitish pubescence. Head finely and sparingly punctured near the vertex, finely striated round the eyes. Antennæ with the second and third joint fulvous. Thorax broader than long, minutely punctured on the disk, stronger at the sides and base. Scutellum broad, triangular, strongly punctured. Elytra rather deeply punctate-striate, the punctures more crowded near the scutellum, the interstices raised a little and smooth. A bright red spot on each shoulder of a rounded, triangular shape, which does not extend to the lateral margin except at the base, which at that place is perfectly smooth. Legs violet-blue.

Length 2 lines.

Hab. California.

This species is closely allied to *S. omogera*, Lacord., and also to *S. quadrina*, Lac., but is distinguished from the first by its much finer punctuation of the elytra, and especially of the thorax, by the antennæ having the 2nd and 3rd joints fulvous, and from *S. quadrina* by the different shape of the red shoulder-spot, which is in this species quadrate, while in the species before us, it is smaller and triangular.

7. SAXINIS GUATEMALENSIS, n. sp.

Oblong, parallel, above dark greenish black, shining, beneath closely covered with white pubescence. Head closely covered with longitudinal striæ, which, towards the mouth only, assume the form of punctures. Thorax much widened in the middle, very convex and everywhere closely covered with distinct punctures, which towards the sides are a little more strongly impressed. Scutellum with a raised middle line also strongly punctured. Elytra very strongly punctate-striate, the intervals between the striæ also distinctly punctured. A large nearly square brick-red spot occupies the shoulders, reaching downwards to about one third of the length of the elytra and transversely to only a short distance from the scutellum. Legs densely covered with white pubescence, through which a coppery reflection is distinctly visible.

Length 3 lines. Collected by Mr. Salvin in Guatemala, at an elevation of 5000 feet. In my collection.

Family CHLAMYDIDÆ.

Genus CHLAMYS, Knoch.

8. CHLAMYS BARTLETTI, sp. nov.

Ovate, metallic violet-blue; head deeply excavated, strongly but not closely punctured; labrum, palpi, underside of first joint, as well as the second and third entire joints, of antennæ ferruginous. Thorax with the lateral margin rounded, the posterior deeply sinuate, rugose-punctate, with a high triangular elevation on the middle of its disk, the top of which is divided by a shallow longitudinal channel, the posterior sides at the same time falling off suddenly towards the base of the thorax, and occupied by another small rounded elevation not reaching the lateral margin. Scutellum acute triangular, impunctate. Elytra with the sutural margin dentate almost through its entire length, the surface of each elytron containing three strongly raised curved ridges running nearly in a line with each other, and connected together by short transverse branches and here and there by a network of elevated striae; besides these three large ridges another short one of an S-shape is situated near the suture at the base, and joined to the first ridge in its middle. Body beneath, together with the legs, greenish blue, closely rugose-punctate; last joint of the tarsi ferruginous.

Length 3 lines.

Hab. Peru.

This beautiful species, which was discovered by Mr. E. Bartlett during his travels in Peru, is easily separated from others by its brilliant metallic blue, its size, and the markings of its elytra (which approach to a certain extent those of *C. episcopalis*, Lac.), but yet is very different in its general character. The species is in my collection.

9. Chlamys unicolor, sp. nov.

Ovate-oblong, convex, subcylindrical, narrowed behind, upper and underside unicolorous bluish olive-green, not shining. Head with a longitudinal impression; anterior margin of epistome rounded, the entire face strongly punctate; labrum shining fulvous; antennæ either entirely or only the basal joints light brown. Sides of thorax almost straight, converging from base to apex, angles moderately acute; posterior margin not bisinuate but largely waved, median lobe moderately produced, its apex bidentate, as usually in this genus; upper surface closely punctate; a humplike elevation of moderate size is situated on the disk, divided by a shallow channel and surrounded on all sides by another narrow depression; each side of the hump is furnished with 6 tubercles, of which 5 are situated in a semicircle, while the sixth is contained in its middle; scutellum transversely subquadrate, its sides sinuate, narrower at the base than at the apex, hollowed out in its middle, impunctate. Elytra distinctly narrowed from their base towards the apex, sides almost as far lobed as their middle; upper surface coarsely but widely punctate, forming only one regular stria at the sutural margin, which latter is finely dentate from the middle to the apex; transverse irregular costæ and a few tubercles are placed without order on the disk of each elytron. Underside deeply impressed with numerous round large punctures, which, however, extend to the legs only sparingly.

Length 2 lines.

Hab. Amazons.

The peculiar olive-green colour, as well as the small size and the position of the tubercles on the thorax, will distinguish this species at first sight from others.

10. Chlamys pallida, sp. nov.

Ovate, narrowed in the middle, above pale testaceous mixed with brown. Head testaceous, with the upper portion of a darker brown closely and rather deeply punctate; flat, without any depressions; apex of jaws black, labrum brown shining; antennæ entirely ferruginous brown. Thorax mounted at its posterior half by a rather high elevation of a triangular shape very nearly of the same form as in *C. bartletti*, but divided by a wider channel, the edges of which are strongly sinuate-rugose; a patch on each side below the elevation, as well as seven small spots arranged in a half-circle in the middle of the thorax, dark brown; the whole surface deeply pitted with brownish punctures, nearly the entire posterior margin dentate, of a black colour; scutellum pale testaceous, with acute posterior angles, impunctate. Elytra deeply punctate, confused-reticulate at their posterior half, the punctures from the base to the middle of a deep brown, from there of a lighter colour; a distinct costa or ridge runs from the base in a curved line towards the apex, not quite reaching the latter, sending off a short branch from the third part of its length towards the base between the shoulder and the first ridge; another short elevation exists close to and a little beneath the scutellum; the entire apical region punctate-reticulate, and the sutural margin dentate nearly through its entire length. Body beneath of the same colour as the elytra; a rounded spot of a ferruginous colour is situated on the abdomen close to the margin of the elytra, while the legs in their middle also bear a patch of the same colour, which occupies the tarsi and claws entirely; the whole undersurface deeply punctured.

Length 3 lines.

Hab. Amazons.

In my collection.

11. Chlamys excavata, sp. nov.

Oblong, subcylindrical, narrowed behind, above entirely ferruginous, below testaceous; head deeply punctate, the punctures of a more or less dark brown colour, labrum fulvous shining, jaws black; basal joints of the antennæ ferruginous, the rest fuscous; thorax raised gradually to a hump-like elevation of a rounded shape, the top of which is divided by a shallow depression, the entire surface closely rugose-punctate, the punctures a little less crowded near the sides; scutellum bisinuate, smooth. Elytra with an excavated space of a dark fuscous colour reaching from the base near the scutellum to nearly the middle of their disk, the commencement and the end of which is marked by a short pointed tubercle; exactly in the middle of each elytron is another fovea of an oblique direction towards the shoulders; the entire surface confusely punctate-rugose, the sutural margin dentate in the same way as the preceding species; pygidium much more widely punctured, the interstices plane, and a little shining. Legs and tarsi of the same colour as the underside; claws fuscous.

Length 2½ lines.

Hab. Amazons.

In my collection.

Family EULMOLPINÆ.

Genus CHALCOPHYMA, Baly.

12. CHALCOPHYMA STRIATUM, sp. nov.

Subquadrangular, rounded behind, cupreous or dark greenish; antennæ, labrum, and tarsi light testaceous. Head very finely striate, the striæ all running towards a depression in the middle of the head; forehead rather widely punctate, closer towards the lower portion of the face. Thorax widened in the middle, the lateral margin bidentate, impressed with very deep punctures, which are more crowded along the anterior margin, leaving an elevated space exactly in the middle of the base either perfectly smooth or with one or two impressions. Scutellum semiovate, impunctate and shining, Elytra either dark cupreous or greenish with a purple reflection round their edges each elytron with five or six elevated and interrupted ridges on its surface, the space between which is deeply punctured, the punctuation terminating in regular striæ towards the apex. Body beneath black; the legs sometimes dark bluish, or copper-coloured; posterior femora near their apex with a distinct triangular tooth.

Length 2–2½ lines.

Hab. Amazons.

In my collection.

13. CHALCOPHYMA TUBERCULATUM, sp. nov.

Subquadrate, bronze-coloured. Head closely punctured, finely striate; antennæ very slender, with the first six joints flavous, the rest fuscous. Thorax deeply rugose-punctate, as well as two large elevations on the middle of its disk; several smaller rugosities are situated near the sides, but are impunctate. Scutellum closely punctured. Elytra deeply rugose and impressed with large punctures aud transverse raised striae, besides which each elytron is also furnished with a number of longitudinal short tubercules, which are situated as follows, viz. one on the shoulder, and a second below it in an oblique direction, four at a little distance from the shoulder running down towards the apex, and two other rows closer towards the suture, running parallel with the last one. Legs rather long for this genus, ferruginous, as well as the last abdominal segments.

Length 2¼ lines.

Hab. Cayenne.

In my collection.

14. CHALCOPHYMA RETICULATUM, sp. nov.

Subquadrate, rounded behind, dark purplish or violet; head marked exactly in the same way as in *C. striata*; antennæ flavous; thorax of the same shape as in the preceding species, deeply and closely punctate, the intervals between the punctures raised and forming a network in a longitudinal direction; towards the sides are some deeper and larger impressions; scutellum smooth, shining; elytra with a number of indistinct elevated costae, between which the space is deeply punctate and rugose. Legs red brown.

Length 2¼ lines.

Hab. Amazons.

This species is sufficiently distinguished from *C. striata* by the reticulate sculpture of the thorax, and the much more numerous costæ on the elytra, which are only now and then interrupted, but extend in two or three instances through the entire length of the elytra.

Genus TYPOPHORUS, Erichson.

15. TYPOPHORUS MEXICANUS, sp. nov.

Ovate, convex, above violet-blue, beneath black with a green tinge. Head reddish brown, finely and sparingly punctured, with a distinct triangular groove at its lower half, and a deep curved depression above each eye; jaws dark brown; antennæ more than half the length of the body, with the first three or four joints reddish, the rest black, covered with whitish pubescence. Thorax of the same colour as the head, with the posterior and lateral margin evenly rounded, the anterior widened in the middle, impressed in the same way as the head, with minute punctures only visible under a strong lens; scutellum broader than long, impunctate. Elytra of about double the length of the thorax, with their sides nearly parallel, violet-blue, impressed with ten rows of punctures, which diminish a little in size towards the apex; below the shoulder is a short transverse depression, usually to be found amongst this genus. Legs and tarsi coloured as the underside.

Length 2½ lines.

Collected by Mr. O. Salvin at Guatemala. In my collection.

16. TYPOPHORUS MELANOCEPHALUS, sp. nov.

Ovate, moderately convex, metallic green or blue. Head greenish black, strongly and closely punctured; antennæ long and slender, with the first five or six joints fulvous, the rest dark brown. Thorax red, a little more strongly punctured than in *T. mexicanus*; otherwise of same shape; the middle of the anterior margin is marked with a short greenish patch which seems to be a continuation of the coloration of the head. Elytra very strongly punctate-striate, with the usual transverse depression below the shoulder. Underside and legs black.

Length 3 lines.

Hab. Mexico.

Although this insect is at the first view only distinguished from the preceding species by its larger size, the above details, especially the strong punctuation and dark colour of the head, I think, justifies the making it a distinct species, moreover as all the specimens in my collection agree exactly in every particular.

17. TYPOPHORUS HUMERALIS, Baly, var. *rufa*.

Ovate, convex, base of the antennæ fulvous. Head, very convex and shining, finely punctured, together with the thorax black. Elytra unicolorous, rufous, which colour extends sometimes over the entire thorax.

Length 2½ lines.

Hab. Guatemala.

Collected by Mr. Salvin.

As this species agrees in every thing with *T. humeralis* of Dr. Baly (described in the Annals of Natural History, 1859), except the coloration, I consider it a mere variety of this species, which, to my knowledge, has not yet been described.

18. TYPOPHORUS QUADRIPLAGATUS, sp. nov.

Ovate, moderately convex, light flavous. Head without a groove near the eyes, which are rather closely approximated, strongly punctate on the vertex, flavous; antennæ of the same colour, with the exception of two or three middle joints, which are a little darker. Thorax of the usual shape, strongly but not closely punctured. Elytra a little narrower at the base than behind the middle, with ten rows of strongly punctured striæ; the intervals slightly raised, of a light flavous colour; each elytron ornamented with two black spots, viz. one on the extreme margin a little before the middle, and a second larger one in the middle, exactly between the margin and the suture. Underside dark brown, as well as the last third of the femora; the rest, with the legs and tarsi, testaceous.

Length 2 lines.

Hab. Amazons.

In my collection.

19. TYPOPHORUS MINUTUS, sp. nov.

Ovate, convex, black-brown, shining. Head very convex, without any trace of a transverse groove, but with a slight depression in the middle, upper part distinctly and closely punctured; first five joints of antennæ flavous, the rest black. Thorax nearly as long as broad, with the sides much contracted towards the anterior margin, and the posterior one a little sinuate, more or less distinctly punctured, scutellum oblong, smooth. Elytra strongly punctate-striate; the first striæ assuming the form of a continuous line towards the apex and parallel with the suture. Underside and legs black.

Length 2 lines.

Hab. Rio Janeiro.

In my collection.

By its minute size and the uniform coloration of all the parts, which now and then and in certain lights assumes on the head and thorax a lighter brown, this species is sufficiently distinguished from others.

Family Chrysomelidæ.

Genus Doryphora, Illig.

20. Doryphora rugosa, sp. nov.

Oblong-ovate, rounded and widened in the middle, very convex towards the first third of the elytra, then falling off abruptly towards the apex. Above blackish blue, variegated with testaceous, below black, shining. Head deeply and closely covered with punctures which run together towards the epistome, with a longitudinal middle groove through its entire length. Antennæ rather longer than the thorax, robust, black, shining, with the third joint the longest and thinnest. Thorax with the lateral margin slightly rounded and the posterior one sinuate, punctured in the same way as the head, on its surface more strongly towards the sides, these latter excavated and flattened and accompanied by a fulvous narrow band, which is much hollowed out at its inner margin. Scutellum impunctate. Elytra broader than the thorax, everywhere covered with rugosities and deep impressions distinctly visible to the naked eye; a narrow dentated band of testaceous colour extends across the middle from one side to the other, sending upwards three or four branches of the same colour towards the base; while the posterior half of the elytra is variegated in the same way, more strongly visible near the suture. The mesosternal process comparatively short and straight.

Length 8 lines.

Hab. Columbia.

In the collection of Dr. Baden, in Altona, and my own.

21. Doryphora costata, sp. nov.

Ovate, very slightly widened behind, very convex towards the first half, then suddenly falling off towards the apex, above dark brown, a little shining, beneath black. Head and thorax without gloss; the first with a rather deep longitudinal impression before the anterior margin of the eyes, a transverse groove between the antennæ, and a few scattered punctures here and there; labrum brown, shining; antennæ not reaching quite to the base of the thorax, light flavous, the first joint much thickened, almost cylindrical, the second very short, the third the longest, double the length of the fourth, the rest thickened, cylindrical. Thorax with the sides straight and parallel, the anterior corners rounded and produced into a point reaching slightly above the eyes; posterior margin slightly sinuate, anterior straight in middle, with a distinct margin which extends also to the sides, where it is, however, very narrow. The surface impressed with a few strong punctures, which are a little more numerous towards the sides. Elytra wider at the base than the thorax, assuming their greatest convexity exactly at the middle, from there suddenly declining to the apex; each elytron with ten rows of elevated ridges, of which the first and second are united at a little distance from the base, and the sixth and seventh at a short distance from the apex; all the interstices between the ridges deeply impressed with shining green punctures. Legs and tarsi brown. The mesosternal process is much developed, slightly curved and pointed.

Length 7 lines; width 5 lines.

Hab. Columbia.

This beautiful insect was collected by Mr. Wallis, and is in the collection of Dr. Baden, in Altona, and my own.

ENSIFORMA, nov. gen.

Elongate, parallel; head small, perpendicular; eyes convex, small; palpi clavate, with a short acute terminal joint; antennæ as long as the body, with the first seven joints (the second excepted) slender, elongate-triangular, the next three greatly widened at their apex and broadly flattened, the terminal joint long, and pointed at the apex. Thorax subquadrangular, narrowed towards the base, the angles obtuse; scutellum broad triangular. Elytra wider at the base than the thorax, the sides parallel, punctate-rugose at the surface. Femora and tibiæ of equal length and size, the first but little widened in the middle; tarsi with the first joint as long as the two following joints together; claws bifid.

Type *Ensiforma cœrulea*, sp. nov.

This genus, which bears a close affinity to the genus *Diabrotica*, will be easily distinguished from that and other genera by the extreme length of the antennæ and their flattened terminal joints.

22. ENSIFORMA CÆRULEA, n. sp.

Elongate, parallel, dark blue above, fuscous below; the head, thorax, the scutellum, and legs flavous. Head transversely grooved, between the eyes joined by a short longitudinal groove in the middle of the face; first four joints of antennæ fuscous above, flavous beneath, the other joints entirely dark brown; eyes black. Thorax with the anterior and posterior margins nearly straight, slightly narrowed from behind the middle to the base, the angles obtuse; above but little convex, with two shallow depressions on the disk near the sides, shining, together with the scutellum impunctate. Elytra a little broader at the base than the thorax, distinctly margined from the shoulder towards the apex; closely punctate and partially transversely rugose, of a dark bluish green colour surrounded at the sides by a narrow light flavous margin, which widens a little at the extreme apex; another short streak of the same colour is situated on each elytron between the shoulder and the scutellum. Underside, the breast excepted, fuscous, as are also the fore legs and posterior femora; tibiæ and tarsi of the last two pair of legs dark brown, covered, as well as the whole underside, with yellowish and rather long hair.

Length 4 lines.

Hab. Brazil.

One specimen in my collection.

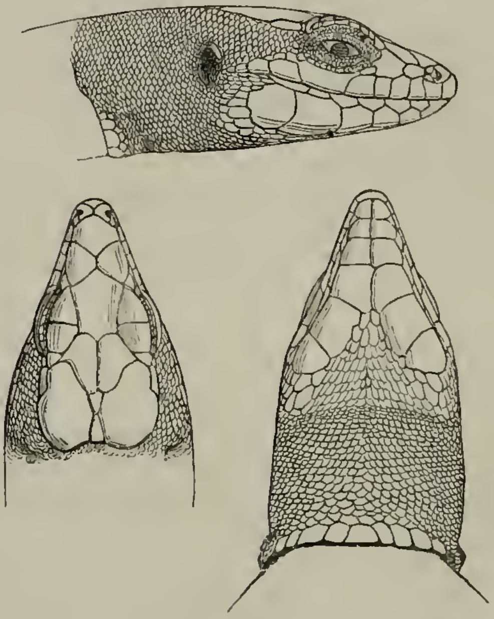
4. Description of a new Species of Lizard from Asia Minor.

By Dr. A. Günther.

[Received November 27, 1876.]

Zootoca danfordi.

Similar in habit to *Z. muralis*. Nasal shields in contact with each other on the upper surface of the snout; two small postnasals, one above the other, followed by two loreal shields. Infraocular shield forming the margin of the upper lip between the fifth and seventh supralabials, five supralabial plates being before the infraocular. Temples covered by very small scales subequal in size, without larger central plate. Posterior frontals in contact with each other. Supraorbitals large, bordered externally by a supraciliary line of granules.



Zootoca danfordi. Not quite twice natural size.

Back covered with smooth roundish granules. Ventral shields broad, in six longitudinal and twenty-eight transverse series. One broad preanal, sometimes divided into two, surrounded anteriorly by six small scutes.

Greenish olive, with black dots, the dots being numerous on the sides of the body and head, and throat, but isolated and sparse on the back and abdomen.

Young specimens reticulated with black. The largest example is 3 inches long, without the tail.

Several specimens of this species were collected by C. G. Danford, Esq., on the Zebil Bulgar Dagh (Cilician Taurus), at an altitude of 4000 feet.

5. Description of a New Snake of the Genus *Aspidura* from Ceylon. By William Ferguson, F.L.S.

[Received November 28, 1876.]

Aspidura guentheri, sp. nov.

The postfrontal enters the orbit, and is in contact with the second and third labials, preorbital well developed and elongate, the postfrontal separating it considerably from the superciliary; the upper postorbital is much larger than the lower one, and is in contact with the superciliary, occipital, and first temporal; six upper labials. Two pairs of chin-shields, the anterior large, about thrice as long as broad; the posterior small, scale-like; six (seven) lower labials, the four anterior of which are in contact with the anterior chin-shields. Scales in 17 rows, smooth, hexagonal, not elongate, and but very slightly imbricate; the first row next ventrals broadest, and the next two rows broader than the others, the length not much greater than the breadth. Ventral shields 104–118, subcaudal 18–26. The circumference of the body is about one tenth of the total length, the length of the tail one eighth. Snout in front of eyes sharply pointed compared with *A. brachyorrhos*. The anterior frontal extends back between the postfrontals further than the anterior ends of the third labials, whilst in *A. brachyorrhos* it is obtuse, and does not extend beyond the second labials. Colour, a glossy shining metallic dark olive-brown above, the belly slate-coloured. Three rows of small indistinct darker spots along the back—one row dorsal, and the others on the fourth or fifth row of scales from the ventrals, each darker spot occupying about one scale, and generally whitish spots on some of the other scales near them. Generally a white collar immediately behind the head, often broader below, and sometimes extending in a Λ from the neck along the upper part of the head, covering portions of the occipitals, and separated by a narrow dark line; often a white spot from upper labials below and behind the eye. These white markings on neck and head are more or less present on all my specimens; but occasionally they are indistinct above, and absent on the lower part of the head. Total length of the longest specimen seen 6·2 inches, the length of tail about 0·7 inch.

Hab. Ceylon.

Dr. Günther having expressed his doubts as to whether two specimens of this species sent to him by me in March 1872 were not the young of *A. brachyorrhos*, and having asked me to reexamine my specimens, I am now in a position to say that *A. guentheri* cannot possibly be confounded with any of the other three species known. *A. copii* is a large stout snake, and found hitherto only in the district of Dickoga, at an elevation of about 4000–5000 feet. *A. trachyprocta* is also an alpine snake, and never found, that I am aware of, except in the mountains of Ceylon. *A. guentheri* cannot be confounded with either of these; and it has scarcely any specific character in common with *A. brachyorrhos*, excepting that both have seventeen rows of scales round the body. *A. brachyorrhos* has never, as far as I know, been found near the coast of Ceylon, whilst *A. guentheri* occurs close to the coast, and never far from it. *A. guentheri* is not the young of any other species of *Aspidura*; because I have seen about one hundred specimens, and I have never seen one longer than about 6 inches, whilst amongst them were several young ones from $1\frac{1}{2}$ to 2 inches in length, retaining all the specific characters and coloration of their parents. A young *A. brachyorrhos,* the size of *A. guentheri* does not in any way differ from its parents or approach *A. guentheri. A. guentheri* differs from *A. brachyorrhos* markedly in the following respects—its small size and dark colour, in the number of its ventrals and subcaudals, its hexagonal-shaped and non-imbricate scales, its pointed snout, the extension backwards of the anterior frontal between the postfrontals, the separation of the preocular from the superciliary by the postfrontal, which runs into the eye, the larger size of the upper postorbital, and the scales it is in contact with. In twelve specimens of *A. guentheri* examined by me, the average number of ventrals was $109\frac{3}{4}$, subcaudals $20\frac{2}{3}$, totals $130\frac{5}{12}$, total length 5·83 inches, length of tail 0·72 inch. The lowest number of ventrals, 104, has the largest number of subcaudals $=26$.

Colombo, Ceylon.
August 29, 1876.

APPENDIX.

LIST OF ADDITIONS TO THE SOCIETY'S MENAGERIE

DURING THE YEAR

1876.

Jan. 1. 1 Pig-tailed Monkey (*Macacus nemestrinus*). Presented by the Rev. W. Ewart.
4. 1 Hooper Swan (*Cygnus ferus*), ♀. Presented by Mr. Montague Kingsford.
5. 1 Weeper Capuchin (*Cebus capucinus*). Presented by Mr. A. Kettner.
1 Levaillant's Cynictis (*Cynictis penicillata*). Presented by Viscount Mandeville. See P. Z. S. 1876, p. 255.
8. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. T. J. Dunn.
2 Darwin's Pucras Pheasants (*Pucrasia darwinii*), ♂ and ♀. Purchased.
12. 1 Palm-Squirrel (*Sciurus palmarum*). Presented by Mr. W. D. Barker, Jun.
1 Manyar Weaver-bird (*Ploceus manyar*). Presented by Mr. W. D. Barker, Jun.
2 Amaduvade Finches (*Estrelda amandava*). Presented by Mr. W. D. Barker, Jun.
2 Nutmeg-birds (*Munia undulata*). Presented by Mr. W. D. Barker, Jun.
15. 1 Emu (*Dromæus novæ-hollandiæ*). Presented by Mr. E. J. Dawes, F.Z.S.
1 Cinereous Sea-Eagle (*Haliaëtus albicilla*). Deposited.
17. 1 Common Marmoset (*Hapale jacchus*). Presented by Master F. Goodliffe.
1 Roseate Cockatoo (*Cacatua roseicapilla*). Deposited.
18. 1 Spotted Cavy (*Cœlogenys paca*). Purchased.
1 Central-American Agouti (*Dasyprocta punctata*). Purchased.
3 Brazilian Caracaras (*Polyborus brasiliensis*). Presented by Mr. W. Petty.
19. 1 Roseate Cockatoo (*Cacatua roseicapilla*). Presented by Dr. Bree, F.Z.S.
1 Coypu Rat (*Myopotamus coypus*). Purchased.
1 White-spotted Crake (*Porzana notata*). Purchased. Captured at sea off Cape Santa Maria. See P. Z. S. 1876, p. 255.
3 Geoffroy's Terrapins (*Platemys geoffroyana*). Purchased.
1 Maximilian's Terrapin (*Hydromedusa maximiliani*). Purchased.

Jan. 20. 2 Gannets (*Sula bassana*). Presented by Lieut. Col. Dugmore.
1 Leopard (*Felis pardus*). Presented by Mr. F. Elton.
1 Black Lemur (*Lemur macaco*). Presented by Mr. Dugald Gilchrist.
1 Rose-hill Parrakeet (*Platycercus eximius*). Presented by Mr. J. Smith.
24. 1 Black-faced Spider Monkey (*Ateles ater*). Presented by Capt. King.
2 Hawk's-billed Turtles (*Chelone imbricata*). Presented by Capt. King.
25. 1 Common Curlew (*Numenius arquatus*). Presented by Mr. Charles Clifton, F.Z.S.
1 Herring-Gull (*Larus argentatus*). Presented by Mr. Charles Clifton, F.Z.S.
1 Common Gull (*Larus canus*). Presented by Mr. Charles Clifton, F.Z.S.
2 Black-headed Gulls (*Larus ridibundus*). Presented by Mr. Charles Clifton, F.Z.S.
2 West-India Rails (*Aramides cayennensis*). Presented by Capt. Crozier.
26. 1 Darwin's Pucras Pheasant (*Pucrasia darwini*). Deposited.
2 Chukar Partridges (*Caccabis chukar*). Presented by Capt. F. Morison.
27. 3 Darwin's Pucras Pheasants (*Pucrasia darwini*). Deposited.
28. 1 Grey Ichneumon (*Herpestes griseus*). Presented by Mr. H. Churchill.
29. 1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mr. T. O. Davis.
2 Starred Tortoises (*Testudo stellata*). Presented by Mrs. Spau.
31. 1 Panda (*Ælurus fulgens*). Purchased. See P. Z. S. 1876, p. 255.
1 Red and Yellow Macaw (*Ara chloroptera*). Deposited.
2 Call-Ducks (*Anas boschas*). Presented by Mr. C. Clifton.

Feb. 1. 2 Snowy Egrets (*Ardea candidissima*). Purchased.
2. 1 Swainson's Lorikeet (*Trichoglossus swainsoni*). Presented by Mrs. G. F. Angus.
3. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. E. Darvell.
4. 1 Hobby (*Hypotriorchis subbuteo*). Presented by Mr. S. Baton.
1 Common Kestrel (*Tinnunculus alaudarius*). Presented by Mr. S. Baton.
5. 1 Red-crested Cardinal (*Paroaria cucullata*). Presented by Mr. P. W. Barlow, Jun.
2 Amadavade Finches (*Estrelda amandava*). Presented by Mr. P. W. Barlow, Jun.
7. 1 Blue-cheeked Barbet (*Megalæma asiatica*). Purchased.
8. 3 Burrowing Owls (*Pholeoptynx cunicularia*). Presented by Mr. A. O. Lumb.
9. 2 Golden Pheasants (*Thaumalea picta*), ♀. Received in exchange.
12. 1 Michie's Tufted Deer (*Lophotragus michianus*), ♂. Purchased. Ningpo district of China. See P. Z. S. 1876, p. 273, and p. 757, pl. LXXVI.
5 Darwin's Pucras Pheasants (*Pucrasia darwini*), 3 ♂ and 2 ♀. Deposited.
15. 1 Red-headed Pochard (*Fuligula ferina*), ♂. Presented by Capt. Salvin.

Feb. 16. 2 White-backed Pigeons (*Columba leuconota*). Purchased. See P. Z. S. 1876, p. 274.

1 Narrow-barred Pigeon (*Macropygia leptogrammica*). Purchased. See P. Z. S. 1876, p. 274.

2 White-necked Storks (*Ciconia episcopus*). Received in exchange.

2 Hill-Francolins (*Arboricola torqueola*). Presented by Mr. W. Jamrach.

1 Bay Bamboo Rat (*Rhizomys badius*). Presented by Mr. J. Wood-Mason. See P. Z. S. 1876, p. 274.

1 Square-spotted Snake (*Oxyrhopus doliatus*). Presented by Mr. J. L. Moore. From Pernambuco.

17. 5 Geoffroy's Doves (*Peristera geoffroii*), 3 ♂ and 2 ♀. Purchased.

1 Tiger Bittern (*Tigrisoma brasiliense*). Purchased.

1 Sociable Vulture (*Vultur auricularis*). Presented by Mr. J. C. Hobbs.

2 Cape-Francolins (*Francolinus capensis*). Presented by Mr. J C. Hobbs.

18. 1 Anderson's Kaleege (*Euplocamus andersoni*), ♀. Presented by Mr. W. Jamrach. See P. Z. S. 1876, p. 274.

3 Rufous-necked Weaver-birds (*Hyphantornis textor*), ♂. Presented by Mrs. Bates.

21. 1 Mouflon (*Oris musimon*), ♂. Deposited.

1 Virginian Eagle-Owl (*Bubo virginianus*). Presented by Mr. H. Wright.

22. 1 Darwin's Pucras (*Pucrasia darwini*), ♀. Deposited.

1 Rose-crested Cockatoo (*Cacatua moluccensis*). Deposited.

2 Widgeon (*Mareca penelope*), ♂ and ♀. Presented by Mr. C. Clifton.

1 Common Wild Duck (*Anas boschas*). Presented by Mr. C. Clifton.

1 Lesser Black-backed Gull (*Larus fuscus*). Presented by Mr. C. Clifton.

3 Herring-Gulls (*Larus argentatus*). Presented by Mr. C. Clifton.

2 Common Gulls (*Larus canus*). Presented by Mr. C. Clifton.

3 Black-headed Gulls (*Larus ridibundus*). Presented by Mr. C. Clifton.

23. 1 Common Otter (*Lutra vulgaris*). Received in exchange.

27. 1 Zebu (*Bos indicus*), ♀. Born in the Gardens.

Mar. 2. 1 Brown Monkey (*Macacus brunneus*), ♂. Presented by Mr. T. G. F. Hesketh, F.Z.S. See P. Z. S. 1876, p. 332. From Siam.

1 Tyrant Eagle (*Spizaëtus tyrannus*). Presented by Lord Lilford, F.Z.S.

1 Many-zoned Hawk (*Melierax polyzonus*). Presented by Lord Lilford, F.Z.S.

2 Patagonian Caracaras (*Polyborus tharus*), pale variety. Presented by Lord Lilford, F.Z.S. See P. Z. S. 1876, p. 333, pl. xxv.

2 Adorned Terrapins (*Clemmys ornata*). Presented by Mr. H. H. Black. From Belize, Honduras.

1 American Box-Tortoise (*Terrapene carinata*). Presented by Mr. H. H. Black. From Belize, Honduras.

3. 2 Common Pintails (*Dafila acuta*), ♂ and ♀. Presented by Mr. E. C. Buck.

Mar. 3. 3 Spotted-billed Ducks (*Anas pœcilorhyncha*), 2 ♂ and 1 ♀. Presented by Mr. E. C. Buck.
18 Red-crested Whistling Ducks (*Fuligula rufina*), 12 ♂ and 6 ♀. Presented by Mr. E. C. Buck.
1 Cape-Dove (*Œna capensis*), ♂. Presented by Miss Borrer.
1 Secretary Vulture (*Serpentarius reptilivorus*). Deposited.
1 Ash-coloured Falcon (*Hypotriorchis concolor*). Presented by Mr. A. F. Allman. Captured in the Mozambique Channel. See P. Z. S. 1876, p. 333.
4 Adorned Terrapins (*Clemmys ornata*). Presented by Capt. Cooper, R.N.
4. 1 Common Buzzard (*Buteo vulgaris*). Presented by Mr. W. Binder.
6. 1 Great Frigate-bird (*Fregata aquila*). Purchased.
3 American Black-backed Geese (*Sarcidiornis carunculata*). Purchased. From Maranham. See P. Z. S. 1876, p. 695, pl. LXVIII.
1 Crested Hangnest (*Ostinops cristatus*). Purchased.
1 Gull-billed Tern (*Sterna anglica*). Purchased.
1 Cayenne Lapwing (*Vanellus cayennensis*). Purchased.
1 Yellow-footed Rock-Kangaroo (*Petrogale xanthopus*), ♀. Born in the Gardens.
8. 2 Forster's Milvagos (*Milvago australis*). Presented by Lord Lilford, F.Z.S.
1 Ogilby's Rat-Kangaroo (*Hypsiprymnus ogilbyi*), ♀. Purchased.
9. 1 Vulpine Phalanger (*Phalangista vulpina*). Purchased.
10. 1 Jackal Buzzard (*Buteo jacal*). Deposited.
1 Ring-necked Parrakeet (*Palæornis torquata*). Purchased.
171 Sand-Lizards (*Lacerta agilis*). Presented by H. Negretti, Esq. From Italy.
11. 1 ¾-breed Zebu (between *Bos indicus* and hybrid *B. frontalis*), ♀. Bred in the Gardens.
1 Araucanian Pigeon (*Columba araucana*). Presented by Lord Lilford, F.Z.S.
12. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Miss L. H. Cowles.
14. 1 Collared Fruit-Bat (*Cynonycteris collaris*). Born in the Gardens.
15. 1 Rhesus Monkey (*Macacus erythræus*), ♂. Presented by Mr. Robert L. Ogilby.
16. 1 White-cheeked Capuchin (*Cebus lunatus*), ♂. Presented by Dr. Lynn.
1 Knot (*Tringa canutus*). Presented by Mr. C. Clifton.
1 Aztec Conure (*Conurus aztec*). Purchased.
2 All-green Parrakeets (*Brotogerys tiriacula*). Purchased.
18. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. J. Shortland.
2 Suricates (*Suricata zenik*), ♂ and ♀. Presented by Mr. J. Thorburn.
20. 2 Green Monkeys (*Cercopithecus callitrichus*), 2 ♂. Presented by Mr. John E. Liardet.
1 Common Badger (*Meles taxus*). Presented by Mr. John E. Liardet.
1 Common Fox (*Canis vulpes*). Presented by Mr. John E. Liardet.
21. 1 Hobby (*Hypotriorchis subbuteo*). Presented by Mr. John Barnet.
1 American Jabiru (*Mycteria americana*). Purchased.

Mar. 23. 1 Ruddy Ichneumon (*Herpestes smithii*). Presented by Mr. C. J. Maude.
1 Sclater's Muntjac (*Cervulus sclateri*). Deposited.
1 Herring-Gull (*Larus argentatus*). Presented by Mrs. Batty.
27. 1 Lesser White-nosed Monkey (*Cercopithecus petaurista*), ♀. Presented by Mr. F. Ward.
28. 1 Impeyan Pheasant (*Lophophorus impeyanus*), ♀. Deposited.
29. 1 South-American Flamingo (*Phœnicopterus igni-palliatus*). Purchased. From Lake Titicaca. See P. Z. S. 1876, p. 333.
3 Sirens (*Siren lacertina*). Presented by Mr. G. E. Maingault. See P. Z. S. 1876, p. 333.
2 Wheatears (*Saxicola œnanthe*). Purchased.

April 1. 1 Common Marmoset (*Hapale jacchus*). Presented by Mrs. Cleaver.
2. 2 Cuming's Octodons (*Octodon cumingi*). Born in the Gardens.
3. 3 Ring-necked Parrakeets (*Palæornis torquata*). Presented by Mrs. A. Moore.
1 Mandrill (*Cynocephalus mormon*), ♂. Presented by Lieut. V. L. Cameron. From the Gaboon.
2 Yellow Baboons (*Cynocephalus babouin*), ♂ and ♀. Presented by Lieut. V. L. Cameron. From the Kwanza. See P. Z. S. 1876, p. 413.
1 Sooty Mangabey (*Cercocebus fuliginosus*), ♀. Presented by Lieut. V. L. Cameron. From the Gaboon. See P. Z. S. 1876, p. 413.
1 Monteiro's Galago (*Galago monteiri*). Presented by Lieut. V. L. Cameron. From Bailunda. See P. Z. S. 1876, p. 413.
1 African Civet Cat (*Viverra civetta*). Presented by Lieut. V. L. Cameron. From the Kwanza. See P. Z. S. 1876, p. 413.
1 Servaline Cat (*Felis servalina*). Presented by Lieut. V. L. Cameron. From the Kwanza. See P. Z. S. 1876, p. 413.
1 Banded Ichneumon (*Herpestes fasciatus*). Presented by Lieut. Cameron. From the Kwanza. See P. Z. S. 1876, p. 413.
1 Senegal Touracou (*Corythaix persa*). Presented by Lieut. V. L. Cameron.
1 Angolan Vulture (*Gypohierax angolensis*). Presented by Lieut. V. L. Cameron. From the Kwanza. See P. Z. S. 1876, p. 413.
1 Marabou Stork (*Leptoptilus crumeniferus*). Presented by Mr. Amzalak, of Angola. From the Kwanza.
3 Broad-fronted Crocodiles (*Crocodilus frontatus*). Presented by Lieut. V. L. Cameron. From the Congo. See P. Z. S. 1876, p. 413.
2 Chestnut-backed Colies (*Colius castanonotus*). Presented by Mr. H. C. Tait, C.M.Z.S. From the river Daude, W. Africa. See P. Z. S. 1876, p. 413, pl. xxxv.
5. 3 Wild Boars (*Sus scrofa*). Born in the Gardens.
6. 1 Little Grebe (*Podiceps minor*). Presented by Dr. S. J. F. Stafford.
7. 1 Sclater's Muntjac (*Cervulus sclateri*), ♂. Presented by Mr. W. H. Medhurst.
1 Sonnerat's Jungle-Fowl (*Gallus sonnerati*), ♀. Deposited.
1 Shining Buzzard-Hawk (*Asturina nitida*). Purchased.
1 Rusty Buzzard (*Urubitinga meridionalis*). Purchased.
8. 1 Arabian Baboon (*Cynocephalus hamadryas*), ♀. Presented by Mr. G. J. Atkins.

April 8. 2 Secretary Vultures (*Serpentarius reptilivorus*). Deposited.
9. 1 Silky Hangnest (*Amblyrhamphus holosericeus*). Presented by Mrs. Arabin.
12. 1 Indian Wild Dog (*Canis primævus*), ♂. Presented by Col. A. C. M'Master. From the Deccan.
1 Common Paradoxure (*Paradoxurus typus*). Presented by Col. A. C. M'Master. From the Deccan.
1 Small Hill-Mynah (*Gracula religiosa*). Presented by Mrs. Smithers.
13. 4 Trout (*Salmo fario*). Presented by Mr. D. Banks.
1 Golden Tench (*Tinca vulgaris*). Presented by Mr. D. Banks.
14. 2 Common Boas (*Boa constrictor*). Presented by Mr. G. W. Des Vœux.
15. 1 Yellow-faced Amazon (*Chrysotis xanthops*). Presented by Mrs. Crawley.
16. 1 Common Eel (*Anguilla vulgaris*). Presented by Dr. A. H. Smee.
1 Great Pipe-fish (*Syngnathus acus*). Presented by Dr. A. H. Smee.
17. 1 Coati (*Nasua nasica*). Purchased.
2 Silky Marmosets (*Midas rosalia*). Purchased.
1 Scaup Duck (*Fuligula marila*), ♂. Presented by Mr. H. Colliver.
19. 5 Specious Pigeons (*Columba speciosa*). Purchased.
2 Cirl Buntings (*Emberiza cirlus*), ♂ and ♀. Purchased.
20. 1 Common Otter (*Lutra vulgaris*). Presented by Mr. J. Herbert.
1 Yarrell's Curassow (*Crax carunculata*), ♂. Presented by Mr. Aug. Ceiyoto.
21. 1 Grey Squirrel (*Sciurus cinereus*), ♀. Presented by Mr. M. E. Symons.
22. 1 Weeper Capuchin (*Cebus capucinus*), ♂. Presented by Major F. J. R. Seaver.
1 Gray's Paradoxure (*Paradoxurus grayi*), ♂. Presented by Dr. Skipton.
2 Common Thicknees (*Œdicnemus crepitans*). Presented by Mr. J. E. Harting, F.Z.S.
23. 1 Molucca Deer (*Cervus moluccensis*), ♀. Born in the Menagerie.
25. 1 Collared Fruit-Bat (*Cynonycteris collaris*). Born in the Menagerie.
4 Blackish Sternotheres (*Sternothærus subniger*). Presented by Mr. Lionel Hart.
1 Entellus Monkey (*Semnopithecus entellus*), ♀. Purchased.
26. 2 Bennett's Cassowaries (*Casuarius bennetti*). Presented by the Rev. George Brown, C.M.Z.S. See P. Z. S. 1876, p. 413.
1 Lyre-bird (*Menura superba*). Purchased.
2 Protei (*Proteus anguinus*). Presented by Sir Bartle E. Frere. From the Cave of Adelsburg.
27. 1 Common Badger (*Meles taxus*), ♂. Presented by Mr. W. Barneby.
1 Black-backed Porphyrio (*Porphyrio melanotus*). Presented by Capt. John Gibb. Captured at sea off New Zealand.
29. 1 Bennett's Gazelle (*Gazella bennettii*), ♀. Presented by Lieut. J. R. King.
3 Common Boas (*Boa constrictor*). Purchased.
1 White-fronted Capuchin (*Cebus albifrons*), ♂. Purchased. From Cartagena.
1 White-throated Capuchin (*Cebus hypoleucus*), ♂. Purchased. From Rio Magdalena.

Apr. 29. 1 Hoffmann's Sloth (*Cholopus hoffmanni*). Purchased. From Panama.

6 Virginian Colins (*Ortyx virginiana*), 3 ♂ and 3 ♀. Purchased. From Jamaica.

1 Wrinkled Terrapin (*Clemmys rugosa*). Purchased. From Jamaica.

30. 1 Dusty Ichneumon (*Herpestes pulverulentus*). Presented by Dr. Alex. Jennings.

1 Broad-fronted Crocodile (*Crocodilus frontatus*). Presented by Dr. Alex. Jennings.

May 1. 1 Black-faced Spider Monkey (*Ateles ater*), ♀. Purchased.

1 Hoffmann's Sloth (*Cholopus hoffmanni*). Purchased.

3 Brown Howlers (*Mycetes fuscus*). Deposited.

1 Brazilian Tree-Porcupine (*Cercolabes prehensilis*). Deposited.

2. 1 Grey Ichneumon (*Herpestes griseus*). Presented by Mr. H. Worth.

3. 2 Leopards, young (*Felis pardus*). Presented by Mr. G. Beale Brown, 1st W.I. Reg.

4. 1 Mouflon (*Ovis musimon*), ♀. Born in the Menagerie.

5 Water-Ouzels (*Cinclus aquaticus*). Presented by Mr. Fred. Swabey.

5. 1 Herring-Gull (*Larus argentatus*). Presented by Mr. Brazenor.

1 Black-headed Gull (*Larus ridibundus*). Presented by Mr. Brazenor.

6. 1 Common Raccoon (*Procyon lotor*). Deposited.

8. 1 Vervet Monkey (*Cercopithecus lalandii*), ♂. Presented by Master O. Billinghurst.

9. 1 American Wolf (*Canis occidentalis*). Received in exchange.

1 Cape-Zorilla (*Ictonyx zorilla*). Received in exchange.

1 Tooth-billed Pigeon (*Didunculus strigirostris*). Purchased. See P. Z. S. 1876, p. 462.

1 Hoffmann's Sloth (*Cholopus hoffmanni*). Born in the Menagerie.

1 Brazilian Teal (*Querquedula brasiliensis*), ♀. Purchased.

10. 1 Leucoryx Antelope (*Oryx leucoryx*). Deposited.

1 Red-crested Cardinal (*Paroaria cucullata*). Presented by Miss Warre.

6 Chilian Pintails (*Dafila spinicauda*). Bred in the Gardens.

11. 2 Secretary Vultures (*Serpentarius reptilivorus*). Presented by Mr. M. G. Angel.

1 Egyptian Cobra (*Naia haje*). Presented by the Rev. G. H. R. Fisk, C.M.Z.S.

1 Common Adder (*Vipera berus*). Presented by Mr. John Hartland.

5 Variegated Sheldrakes (*Tudorna variegata*). Bred in the Gardens.

12. 1 Passerine Owl (*Glaucidium passerinum*). Presented by Mr. H. M. G. Bird.

13. 1 Maholi Galago (*Galago maholi*), ♂. Presented by Mr. R. A. Zeederberg, M.D.

1 Horseshoe Snake (*Zamenis hippocrepis*). Presented by Mr. C. Bartlett. From near Gibraltar.

15. 1 Purple-faced Monkey (*Semnopithecus leucoprymnus*). Presented by Mr. A. J. Keason.

16. 2 Hairy Armadillos (*Dasypus villosus*). Born in the Menagerie.

18. 1 Weeper Capuchin (*Cebus capucinus*), ♀. Deposited.

May 18. 1 Great Kangaroo (*Macropus giganteus*), ♂. Born in the Menagerie.
1 Thar Goat (*Capra iemlaica*), ♂. Born in the Menagerie.
2 Javan Fish-Owls (*Ketupa javanensis*). Received in exchange.
1 Diuca Finch (*Diuca grisea*). Purchased.
2 Pileated Song-Sparrows (*Zonotrichia pileata*). Purchased.
2 Gay's Finches (*Phrygilus gayi*). Purchased.
1 Alaudine Finch (*Phrygilus alaudinus*). Purchased.
1 Orchard-Finch (*Phrygilus fruticeti*). Purchased.
1 Falkland-Island Thrush (*Turdus falklandicus*). Purchased.
1 Black-faced Ibis (*Geronticus melanotis*). Purchased.
20. 1 White-backed Trumpeter (*Psophia leucoptera*). Presented by Mr. H. Stacey Marks, F.Z.S. See P. Z. S. 1876, p. 463.
2 Hawfinches (*Coccothraustes vulgaris*), ♂ and ♀. Purchased.
1 Red-backed Shrike (*Lanius collurio*). Purchased.
1 Geoffroy's Dove (*Peristera geoffroyi*). Bred in the Gardens.
21. 2 Common Jackals (*Canis aureus*). Presented by Mr. W. J. Haddock.
4 Chinchillas (*Chinchilla lanigera*). Born in the Menagerie.
1 Brazilian Land-Tortoise (*Testudo tabulata*). Deposited.
1 Dark-green Maize-eater (*Pseudolcistes virescens*). Purchased.
22. 1 Common Barn-Owl (*Strix flammea*). Presented by Mrs. Knight.
23. 1 Silver Pheasant (*Euplocamus nycthemerus*), ♀. Presented by Mr. W. Miles.
26. 1 Silky Marmoset (*Midas rosalia*), ♂. Purchased.
1 Huanaco (*Lama huanacos*), ♂. Purchased.
3 Chinchillas (*Chinchilla lanigera*). Purchased.
1 Azara's Fox (*Canis azaræ*), ♀. Purchased.
1 Blue-fronted Amazon (*Chrysotis amazonica*). Presented by Miss M. Jukes.
29. 1 Vulpine Phalanger (*Phalangista vulpina*). Presented by Mr. C. H. A. Forbes.
2 Barnard's Parrakeets (*Platycercus bernardi*). Deposited.
30. 1 Bonnet-Monkey (*Macacus radiatus*). Born in the Menagerie.
1 Ocelot (*Felis pardalis*). Presented by Mr. W. A. Sumner.
1 White-bellied Sea-Eagle (*Haliaëtus leucogaster*). Purchased.
31. 1 Black-faced Spider Monkey (*Ateles ater*), ♀. Purchased.
2 Globose Curassows (*Crax globicera*), ♂ and ♀. Purchased. From Cartagena. See P. Z. S. 1876, p. 463.
1 Derbian Screamer (*Chauna derbiana*). Purchased. From Cartagena.
1 Rose-billed Tree-Duck (*Dendrocygna autumnalis*). Purchased.
1 White-throated Capuchin (*Cebus hypoleucos*), ♂. Purchased.
4 Fawn-coloured Field-Mice (*Mus cervicolor*). Presented by Col. C. S. Sturt, C.M.Z.S. See P. Z. S. 1876, p. 463.
1 Soft-billed Duck (*Hymenolæmus malacorhynchus*), ♀. Presented by Acclim. Soc. of Otago, N. Z. See P. Z. S. 1876, p. 463.

June 1. 1 Blue Jay (*Cyanocitta cristata*). Presented by Mr. E. Hawkins.
1 Chinese Jay-Thrush (*Garrulax chinensis*). Presented by Mr. E. Hawkins.
2. 1 Suricate (*Suricata zenik*). Received in exchange.
5. 1 Rose-crested Cockatoo (*Cacatua moluccensis*). Presented by Mr. G. J. Webb.

June 5. 9 Spotted-billed Ducks (*Anas pœcilorhyncha*). Bred in the Gardens.

6. 1 Common Wolf (*Canis lupus*). Presented by Viscount Hill, F.Z.S.

2 Black Spur-winged Geese (*Plectropterus niger*). Received from Lieut.-General A. V. Cunyngham. From Zanzibar. See P. Z. S. 1877, pl. VII.

1 Great Barbet (*Megalæma virens*). Purchased.

7. 1 Mexican Deer (*Cervus mexicanus*), ♂. Presented by Mr. T. B. Forward.

2 Galapagan Tortoise (*Testudo elephantopus*). Deposited. See P. Z. S. 1876, p. 693.

1 Rhomb-marked Snake (*Psammophylax rhombeatns*). Presented by the Rev. G. H. R. Fisk. From near Cape-town.

7 Chiloe Wigeon (*Mareca chiloensis*). Bred in the Gardens.

8. 1 Black-faced Spider Monkey (*Ateles ater*), ♂. Purchased.

1 Humboldt's Lagothrix (*Lagothrix humboldti*). Purchased.

1 Ocelot (*Felis pardalis*). Purchased.

1 Tayra (*Galictis barbara*). Purchased.

1 Golden Agouti (*Dasyprocta aguti*). Purchased.

3 Flamingoes (*Phœnicopterus antiquorum*). Purchased.

4 Black Larks (*Melanocorypha yeltoniensis*). Purchased.

6 Japanese Teal (*Querquedula formosa*), 3 ♂ and 3 ♀. Purchased.

2 Grey-breasted Parrakeets (*Bolborhynchus monachus*). Presented by Miss Thomson.

1 Horned Viper (*Vipera cornuta*). Presented by Rev. G. H. R. Fisk. From the Cape.

9. 2 Indian White Cranes (*Grus leucogeranus*). Purchased.

1 Macaque Monkey (*Macacus cynomolgus*). Deposited.

10. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. R. W. Sanders.

1 White-throated Capuchin (*Cebus hypoleucus*). Presented by Mr. L. E. Jonas.

1 Coati (*Nasua nasica*). Deposited.

2 Emus (*Dromæus novæ hollandiæ*). Deposited.

2 Galapagan Tortoises (*Testudo elephantopus*). Deposited.

1 Glass Snake (*Pseudopus pallasi*). Deposited.

12. 2 Geoffroy's Doves (*Peristera geoffroii*). Bred in the Gardens.

1 Moor-Monkey (*Semnopithecus maurus*), ♀. Purchased.

1 Bay Antelope (*Cephalophus dorsalis*), ♀. Purchased.

1 Black Sternothere (*Sternothærus niger*). Purchased.

13. 2 Black-eared Marmosets (*Hapale penicillata*). Presented by Mr. Geo. Newton.

1 Black-faced Spider Monkey (*Ateles ater*), ♀. Purchased.

1 Puma (*Felis concolor*), ♀. Purchased.

1 Cariama (*Cariama cristata*). Presented by Captain W. C. Chapman, R.N.

1 Red-backed Shrike (*Lanius collurio*), ♀. Purchased.

1 Chaffinch (*Fringilla cœlebs*). Presented by Mr. E. Roberts.

16. 2 Vulturine Guinea Fowls (*Numida vulturina*). Deposited.

3 Chaplain Crows (*Corvus advena*). Presented by Mr. J. Huntley. From Fao, Persian Gulf. See P. Z. S. 1876, p. 693, pl. lxvi.

1 Rose-ringed Parrakeet (*Palæornis docilis*), ♀. Presented by Mrs. Haywood.

1 Hyacinthine Macaw (*Ara hyacinthina*). Presented by Mr. Hugh Wilson.

June 16. 1 West-Indian Rail (*Aramides cayennensis*). Purchased.
1 Common Boa (*Boa constrictor*). Purchased.
17. 1 Tree-Boa (*Corallus hortulanus*). Purchased.
19. 1 Eland (*Oreas canna*), ♂. Born in the Gardens.
1 Sclater's Muntjac (*Cervulus sclateri*), ♂. Deposited.
2 Darwin's Pucras (*Pucrasia darwini*), ♂ and ♀. Deposited.
20. 1 Malbrouck Monkey (*Cercopithecus cynosurus*), ♀. Presented by Dr. Stirling.
2 Tigers (*Felis tigris*). Presented by Dr. Marchant Jones. From Amoy, China. See P. Z. S. 1876, p. 694.
1 Northern Buzzard (*Buteo borealis*). Presented by Capt. W. J. Tibbs, 98th Regt.
22. 1 Pine-Marten (*Martes abietum*). Presented by F. Nicholson, Esq., F.Z.S.
5 Red-headed Weaver-birds (*Foudia madagascariensis*). Presented by the Misses S. E. P. and A. Warre.
1 Cape Weaver-bird (*Hyphantornis capensis*). Presented by the Misses S. E. P. and A. Warre.
1 Paradise Whydah-bird (*Vidua paradisea*). Presented by the Misses S. E. P. and A. Warre.
3 Red-bellied Waxbills (*Estrelda rufiventris*). Presented by the Misses S. E. P. and A. Warre.
1 Java Sparrow (*Padda oryzivora*). Presented by the Misses S. E. P. and A. Warre.
1 Common Linnet (*Linaria cannabina*). Presented by the Misses S. E. P. and A. Warre.
24. 1 Gerrard's Squirrel (*Sciurus gerrardi*). Purchased. From Cartagena. See P. Z. S. 1876, p. 694.
1 Central American Agouti (*Dasyprocta punctata*). Purchased. From Cartagena.
1 Common Ocelot (*Felis pardalis*), ♂. Purchased. From Rio Magdalena.
1 Red-and-yellow Macaw (*Ara chloroptera*). Purchased. From Cartagena.
2 Red-billed Tree-Ducks (*Dendrocygna autumnalis*). Purchased. From Cartagena.
1 Hicotee Terrapin (*Clemmys decussata*). Purchased. From Jamaica.
1 Common Waxbill (*Estrelda cinerea*). Presented by Miss Barlow.
26. 11 Lineated Pheasants (*Euplocamus lineatus*). Bred in the Gardens.
9 Amherst's Pheasants (*Thaumalea amherstiæ*). Bred in the Gardens.
9 Gold Pheasants (*Thaumalea picta*). Bred in the Gardens.
2 Peacock Pheasants (*Polyplectron chinquis*). Bred in the Gardens.
27. 1 Bronze-winged Pigeon (*Phaps chalcoptera*). Bred in the Gardens.
28. 1 Sumatran Rhinoceros (*Rhinoceros sumatrensis*). Purchased. See P. Z. S. 1876, p. 694.
4 Phalangers (*Belideus ariel*). Presented by Mr. O. C. Stone. See P. Z. S. 1876, p. 694.
1 Cape-Buffalo (*Bubalus caffer*). Deposited.

July 1. 2 African Cheetahs (*Felis jubata*). Presented by T. L. M. Cartwright, Esq., F.Z.S.

July 2. 2 Peregrine Falcons (*Falco peregrinus*). Presented by Mr. Herbert Wood.
3 Summer-Ducks (*Aix sponsa*). Bred in the Gardens.
3 Rosy-billed Ducks (*Metopiana peposaca*). Bred in the Gardens.
1 Grey Parrot (*Psittacus erithacus*). Purchased.
3. 2 Silky Hangnests (*Amblyrhamphus holosericeus*). Bred in the Gardens.
1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. G. Hollis.
4. 1 Moorish Tortoise (*Testudo mauritanica*). Presented by Mr. Milne.
5. 1 Great-headed Maleo (*Megacephalon maleo*). Purchased.
1 Bornean Fireback Pheasant (*Euplocamus nobilis*), ♀. Purchased.
2 Common Crowned Pigeons (*Goura coronata*). Purchased.
2 Black-backed Geese (*Sarcidiornis melanonota*), ♂ and ♀. Purchased. See P. Z. S. 1876, p. 694, pl. LXVII.
1 Saddle-billed Stork (*Xenorhynchus senegalensis*). Purchased.
1 Indian Python (*Python molurus*). Purchased.
1 Roseate Cockatoo (*Cacatua roseicapilla*). Presented by Misses Campbell.
1 Hawfinch (*Coccothraustes vulgaris*). Deposited.
7. 2 One-streaked Hawks (*Melierax monogrammicus*). Purchased.
8. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Miss Preston.
2 Common Cormorants (*Phalacrocorax carbo*). Received in exchange.
10. 3 Shoveller Ducks (*Spatula clypeata*). Bred in the Gardens.
2 Summer-Ducks (*Aix sponsa*). Bred in the Gardens.
2 Royal Pythons (*Python regius*). Presented by Mr. J. J. Kendal.
11. 2 Striped Hyænas (*Hyæna striata*). Purchased.
1 Alligator (*Alligator mississippiensis*). Purchased.
12. 2 Vulpine Phalangers (*Phalangista vulpina*). Born in the Gardens.
1 Talapoin Monkey (*Cercopithecus talapoin*). Purchased.
2 American White Cranes (*Grus americana*). Purchased.
1 Green-winged Trumpeter (*Psophia viridis*). Purchased.
2 Celebean Rails (*Rallus celebensis*). Purchased.
14. 1 Greater Sulphur-crested Cockatoo (*Cacatua galerita*). Presented by Mrs. Baliol Scott.
1 Common Squirrel (*Sciurus vulgaris*). Presented by Mr. à Court Repington.
1 Reeves's Muntjac (*Cervulus reevesi*). Born in the Gardens.
18. 1 Common Rhea (*Rhea americana*). Purchased.
1 Naked-throated Bell-bird (*Chasmorhynchus nudicollis*). Purchased.
2 Yellow Hangnests (*Cassicus persicus*). Purchased.
2 White-bellied Thrushes (*Turdus albiventris*). Purchased.
2 Brazilian Teal (*Querquedula brasiliensis*), ♂ and ♀. Purchased.
2 Snowy Egrets (*Ardea candidissima*). Purchased.
2 South-American Little Bitterns (*Butorides cyanurus*). Purchased.
2 Sulphury Tyrant Birds (*Pitangus sulphuratus*). Purchased.

July 18. 2 Silky Cow-birds (*Molothrus cyaneus*). Purchased.
1 Silver-blue Tanager (*Tanagra cana*). Purchased.
1 Blue Grosbeak (*Guiraca cyanea*). Purchased.
1 Ocelot (*Felis pardalis*), ♀. Presented by Mr. Zurcher.
19. 2 Central-American Agouti (*Dasyprocta punctata*). Purchased.
2 Australian Bustards (*Eupodotis australis*), ♂ and ♀. Deposited.
12 Jameson's Gulls (*Larus jamesoni*). Presented by Mr. A. H. Jamrach.
1 Shining Parrakeet (*Pyrrhulopsis splendens*). Purchased.
1 White-backed Pigeon (*Columba leuconota*). Deposited.
2 Diuca Finches (*Diuca grisea*). Bred in the Gardens.
1 American Thrush (*Turdus migratorius*). Presented by D. J. Kemp, Esq.
20. 2 Common Ravens (*Corvus corax*). Deposited.
13 Gold Pheasants (*Thaumalea picta*). Bred in the Gardens.
9 Amherst Pheasants (*Thaumalea amherstiæ*). Bred in the Gardens.
2 Lineated Pheasants (*Euplocamus lineatus*). Bred in the Gardens.
1 Temminck's Tragopan (*Ceriornis temmincki*). Bred in the Gardens.
4 Silky Marmosets (*Midas rosalia*). Purchased.
1 King Vulture (*Gypagus papa*). Purchased.
1 Crested Curassow (*Crax alector*). Purchased.
1 Razor-billed Curassow (*Mitua tuberosa*). Purchased.
1 Naked-throated Bell-bird (*Chasmorhynchus nudicollis*). Purchased.
1 Ariel Toucan (*Ramphastos ariel*). Purchased.
1 Green-billed Toucan (*Ramphastos dicolorus*). Purchased.
4 Sayaca Tanagers (*Tanagra sayaca*). Purchased.
6 Festive Tanagers (*Calliste festiva*). Purchased.
9 Green-headed Tanagers (*Calliste tricolor*). Purchased.
6 All-green Tanagers (*Chlorophonia viridis*). Purchased.
2 Violet Tanagers (*Euphonia violacea*). Purchased.
1 Brown Howler (*Mycetes fuscus*). Purchased.
1 Ocelot (*Felis pardalis*). Purchased.
2 White-throated Capuchins (*Cebus hypoleucos*), ♂ and ♀. Purchased.
1 Black-handed Spider Monkey (*Ateles melanochir*), ♂. Deposited.
1 Marimonda Spider Monkey (*Ateles belzebuth*), ♀. Deposited.
1 Coati (*Nasua nasica*). Presented by the Hon. C. W. Finch.
3 Passerine Owls (*Glaucidium passerinum*). Purchased.
21. 2 Lesser White-nosed Monkeys (*Cercopithecus petaurista*), ♂ and ♀. Presented by Mr. Miles.
1 Brown Bear (*Ursus arctos*). Purchased. See P. Z. S. 1876, p. 695.
1 Tennent's Squirrel (*Sciurus tennenti*). Purchased.
1 Mongoose Lemur (*Lemur mongoz*). Purchased.
23. 1 Eland (*Oreas canna*), ♂. Bred in the Gardens.
3 Common Kestrels (*Tinnunculus alaudarius*). Presented by Mr. A. Knight.
24. 2 Tigers (*Felis tigris*), ♂ and ♀. Presented by H.R.H. the Prince of Wales.
2 Indian Leopards (*Felis pardus*). Presented by H.R.H. the Prince of Wales.

July 24. 1 Indian Elephant (*Elephas indicus*), ♀. Presented by H.R.H. the Prince of Wales.

2 Indian Antelopes (*Antelope cervicapra*), ♂ ♂. Presented by H.R.H. the Prince of Wales.

2 Horned Tragopans (*Ceriornis satyra*), ♂ and ♀. Presented by H.R.H. the Prince of Wales.

1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. L. J. Drew.

4 Chilian Pintail (*Dafila spinicauda*). Bred in the Gardens.

4 Common Teal (*Querquedula crecca*). Bred in the Gardens.

25. 1 Axis Deer (*Cervus axis*), ♂. Born in the Gardens.

26. 1 Anubis Baboon (*Cynocephalus anubis*), ♂. Received in exchange.

1 Mocassin Snake (*Tropidonotus fasciatus*). Purchased.

1 Argentine Tortoise (*Testudo argentina*). Purchased.

1 Brazilian Tortoise (*Testudo tabulata*). Purchased.

27. 2 Ring-necked Parrakeets (*Palæornis torquata*). Presented by Mrs. Doxat.

2 Australian Crows (*Corvus australis*). Received in exchange.

2 Crested Guinea Fowls (*Numida cristata*). Bred in the Gardens. See P. Z. S. 1876, p. 695.

31. 1 Small Indian Mynah (*Gracula religiosa*). Presented by Mrs. Frederic Watt.

Aug. 1. 1 Raccoon-like Dog (*Nyctereutes procynides*), ♀. Presented by Capt. Burgoyne. From China. See P. Z. S. 1876, p. 695.

1 Common Hangnest (*Icterus vulgaris*). Purchased. From Mexico.

1 Sorry Thrush (*Turdus tristis*). Purchased. From Mexico.

2 Yellow-headed Troupials (*Xanthocephalus icterocephalus*). Purchased. From Mexico.

1 Black-headed Grosbeak (*Hedymeles melanocephalus*). Purchased. From Mexico.

1 Orchard-Hangnest (*Icterus spurius*). Purchased. From Mexico.

2 Blood-stained Finches (*Carpodacus hæmorrhous*). Purchased. From Mexico.

1 Wagler's Troupial (*Icterus wagleri*). Purchased. From Mexico.

1 Blue Grosbeak (*Guiraca cærulea*). Purchased. From Mexico.

2 Rich Black Troupials (*Lampropsar dives*). Purchased. From Mexico.

2. 1 Senegal Touracou (*Corythaix persa*). Purchased.

1 Tuberculated Lizard (*Iguana tuberculata*). Purchased.

4 Scorpion Mud-Terrapins (*Cinosternon scorpioides*). Presented by Mr. S. Devenish.

4. 1 White-fronted Capuchin (*Cebus albifrons*), ♂. Presented by Mr. H. B. Warren.

1 Yellow-shouldered Amazon (*Chrysotis ochroptera*). Presented by Mr. H. B. Warren.

5. 1 Brown Coati (*Nasua nasica*). Presented by the Rev. C. Corfield.

1 Common Magpie (*Pica caudata*). Deposited.

7 Common Guillemots (*Uria troile*). Presented by Sir H. Dalrymple, Bart.

1 Kittiwake-Gull (*Rissa tridactyla*). Presented by Sir H. Dalrymple, Bart.

6. 2 Hairy Armadillos (*Dasypus villosus*). Born in the Gardens.

8. 5 Gold Pheasants (*Thaumalea picta*). Bred in the Gardens.

Aug. 8. 1 Amherst Pheasant (*Thaumalea amherstiæ*). Bred in the Gardens.
1 Siamese Pheasant (*Euplocamus prælatus*). Bred in the Gardens.
9. 1 Leopard Tortoise (*Testudo pardalis*). Deposited.
10. 1 Crested Pigeon (*Ocyphaps lophotes*). Bred in the Gardens.
1 Porto-Rico Pigeon (*Columba corensis*). Bred in the Gardens.
2 Black Iguanas (*Metopoceros cornutus*). Purchased.
11. 1 Ruddy Ichneumon (*Herpestes smithii*). Presented by Miss Bidder.
12. 1 Grizzly Bear (*Ursus ferox*). Purchased. From California. See P. Z. S. 1876, p. 695.
2 Booted Eagles (*Aquila pennata*). Deposited.
3 Common Bustards (*Otis tarda*). Deposited.
14. 1 Kit Fox (*Canis velox*). Presented by Surgeon-Major Archer. From Honduras.
1 Rufous-vented Guan (*Penelope cristata*). Purchased. From Nicaragua.
1 Fugitive Snake (*Dromicus fugitivus*). Purchased. From St. Lucia, W. I.
1 Hawk-billed Turtle (*Chelone imbricata*). Purchased.
1 Common Cuckoo (*Cuculus canorus*). Presented by Mr. J. Paddy.
15. 1 Egyptian Vulture (*Neophron percnopterus*). Deposited.
2 White-crested Laughing Thrushes (*Garrulax leucolophus*). Purchased. See P. Z. S. 1876, p. 695.
1 Yellow-billed Liothrix (*Liothrix luteus*). Presented by Mr. W. Prehn.
2 Common Barn-Owls (*Strix flammea*). Presented by Miss Hicks.
18. 1 Spotted Eagle (*Aquila nævia*). Presented by Mr. W. Prodham.
1 Bengal Pitta (*Pitta bengalensis*). Purchased. See P. Z. S. 1876, p. 696.
19. 1 Sun-Bittern (*Eurypyga helias*). Purchased.
21. 2 Green Monkeys (*Cercopithecus callitrichus*), 2 ♂. Presented by Mr. H. Richardson.
2 Russell's Vipers (*Vipera russelli*). Presented by Mr. H. Saunders.
22. 1 Sloth-Bear (*Melursus labiatus*), ♀. Presented by Lieuts. Royle and Gray, R.N.
3 Dark Green Snakes (*Zamenis atrovirens*). Presented by Lord Lilford, R.N., F.Z.S. From Dalmatia.
1 Leopardine Snake (*Zamenis leopardinus*). Presented by Lord Lilford, R.N., F.Z.S. From Dalmatia.
4 Dahl's Snakes (*Zamenis dahli*). Presented by Lord Lilford, R.N., F.Z.S. From Dalmatia.
23. 1 Fieldfare (*Turdus pilaris*). Purchased.
1 Ortolan Bunting (*Emberiza hortulana*). Purchased.
2 Diuca Finches (*Diuca grisea*). Bred in the Gardens.
24. 1 Macaque Monkey (*Macacus cynomolgus*). Born in the menagerie.
25. 1 Hoffmann's Sloth (*Cholopus hoffmanni*). Deposited.
29. 1 Reticulated Python (*Python reticulatus*). Presented by Dr. Hampshire. From Penang.
2 Wattled Guans (*Aburria carunculata*). Presented by Mr. L. Merinor. See P. Z. S. 1876, p. 696.
1 Doubtful Toucan (*Ramphastos ambiguus*). Presented by Mr. L. Merino.

Aug. 29. 2 White-headed Sea-Eagles (*Haliaëtus leucocephalus*). Presented by Mr. F. W. Stockwell.
30. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. W. Holman.
1 Adorned Terrapin (*Clemmys ornata*). Purchased.
31. 2 Arabian Gazelles (*Gazella arabica*), ♂ and ♀. Deposited.

Sept. 1. 1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mr. A. Stafford Northcote.
2 Salt-water Terrapins (*Clemmys terrapin*). Presented by Mr. E. B. Scott From Galveston, Texas.
2. 1 Leonine Monkey (*Macacus leoninus*), ♀. Presented by Mr. F. Barbellion.
1 White-fronted Capuchin (*Cebus albifrons*), ♂. Presented by the Rev. J. Roe.
1 White-throated Capuchin (*Cebus hypoleucus*), ♀. Presented by the Rev. J. Roe.
4. 1 Greater Black-backed Gull (*Larus marinus*). Presented by Mr. W. J. Stebbing.
6. 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Dr. J. T. Blackley.
1 Long-eared Owl (*Otus vulgaris*). Presented by the Misses S. E. P. and A. Warre.
2 Salt-water Terrapins (*Clemmys terrapin*). Presented by Mr. J. R. Gillespie. From Galveston, Texas.
2 Yellow-billed Ducks (*Anas xanthorhyncha*), ♀ ♂. Received in exchange.
2 Plumed Colins (*Callipepla picta*). Received in exchange.
2 Bronze-winged Pigeons (*Phaps chalcoptera*). Bred in the Gardens.
7. 2 Common Barn-Owls (*Strix flammea*). Presented by Mr. T. May.
9. 3 Hybrid Bankiva Fowls (between *Gallus bankiva* and *Gallus domesticus*). Presented by Mr. H. F. Phillips.
12. 1 Pig-tailed Monkey (*Macacus nemestrinus*), ♀. Presented by Mr. T. Meyrick.
13. 2 Black-faced Spider Monkeys (*Ateles ater*). Purchased.
1 Common Raccoon (*Procyon lotor*). Presented by Mr. H. B. Whitmarsh.
1 Coati (*Nasua nasica*), ♂. Presented by Mr. C. R. Bree, F.Z.S.
1 King Parrakeet (*Aprosmictus scapulatus*). Presented by Mr. H. T. Sissons.
2 Perch (*Perca fluviatilis*). Presented by Master Sclater.
11 Perch (*Perca fluviatilis*). Presented by Master B. L. Sclater.
14. 1 Crowned Eagle (*Spizaëtus coronatus*), juv. Presented by Sergt.-Major S. Rowe. From Rio Pongas, W. Africa.
1 Fork-tailed Jungle-Fowl (*Gallus furcatus*). Presented by Mr. W. T. Fraser, C.M.Z.S.
15. 1 Black-eared Marmoset (*Hapale penicillata*), ♀. Presented by Miss Woelworth.
1 Burchell's Zebra (*Equus burchelli*), ♂. Deposited.
16. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. E. Soy.
1 Bonnet-Monkey (*Macacus radiatus*), ♂. Deposited.
2 Hairy Armadillos (*Dasypus villosus*). Purchased.
2 Russell's Vipers (*Vipera russelli*). Born in the Gardens.

Sept. 18. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. C. E. Green.
1 Grey Ichneumon (*Herpestes griseus*), ♂. Presented by Mr. G. J. Hendry.
19. 1 Common Boa (*Boa constrictor*). Presented by Mr. F. B. Bloxham.
1 Red-and-yellow Macaw (*Ara chloroptera*). Deposited.
20. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. R. K. Meaden.
1 Hog-Deer (*Cervus porcinus*), ♂. Born in the Menagerie.
22. 1 Striped Hyæna (*Hyæna striata*). Presented by Mr. T. Barber.
1 Arabian Gazelle (*Gazella arabica*), ♀. Presented by Mr. F. de Havilland Hall.
1 Red-fronted Amazon (*Chrysotis vittata*). Purchased.
23. 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Capt. J. C. A. Lewis.
25. 1 Slaty-headed Parrakeet (*Palæornis schisticeps*). Purchased. See P. Z. S. 1876, p. 696.
1 Ring-necked Parrakeet (*Palæornis torquata*). Presented by Mrs. B. Bennett.
5 Perch (*Perca fluviatilis*). Presented by Master B. L. Sclater.
26. 1 Bonnet-Monkey (*Macacus radiatus*). Presented by Mr. John Long.
27. 1 Black-eared Marmoset (*Hapale penicillata*). Presented by the Rev. S. R. Long.
28. 1 Rüppell's Spur-winged Goose (*Plectropterus rueppelli*), ♂. Presented by M. J. M. Cornély, C.M.Z.S. See P. Z. S. 1876, p. 696.
29. 4 American Darters (*Plotus anhinga*). Purchased. See P. Z. S. 1876, p. 696.
2 Brazilian Cormorants (*Phalacrocorax brasiliensis*). Purchased.
2 Boat-bills (*Cancroma cochlearia*). Purchased.
1 Sun-Bittern (*Eurypyga helias*). Purchased.
1 Black-necked Buzzard (*Buteogallus nigricollis*). Purchased.
2 Black-faced Ibises (*Geronticus melanopis*). Purchased.
1 Stilt-Plover (*Himantopus nigricollis*). Purchased.
1 Rufous Tinamou (*Rhynchotus rufescens*). Purchased.
1 Tataupa Tinamou (*Crypturus tataupa*). Purchased.
1 Undulated Tinamou (*Crypturus undulatus*). Purchased.
2 West-African Melba Finches (*Pytelia citerior*). Purchased.
5 Scaly-fronted Finches (*Estrelda squamifrons*). Purchased.
5 Brazilian Teal (*Querquedula brasiliensis*). Purchased.
3 Bahama Ducks (*Pœcilonetta bahamensis*). Purchased.
1 Red-billed Tree-Duck (*Dendrocygna autumnalis*). Purchased.
1 Western Slender-billed Cockatoo (*Licmetis pastinator*). Received in exchange.
2 Chinese Jay-Thrushes (*Garrulax chinensis*). Received in exchange.
1 Grey Struthidea (*Struthidea cinerea*). Received in exchange.

Oct. 2. 2 Silky Marmosets (*Midas rosalia*), ♂ ♀. Presented by Master T. A. Brassey.
1 Green Monkey (*Cercopithecus callitrichus*), ♀. Presented by Mr. C. L. N. Ingram.
2 Pied Wagtails (*Motacilla yarrelli*). Purchased.

Oct. 3. 2 Coatis (*Nasua nasica*). Presented by Mr. J. A. Watson.
1 Entellus Monkey (*Semnopithecus entellus*). Presented by Mr. Edwin Penn.
4. 1 Vulpine Phalanger (*Phalangista vulpina*). Presented by the Hon. Graham M. Sutton.
4 European Terrapins (*Clemmys europæa*). Presented by Mr. Ewd. Wm. Bonham.
5. 2 Tora Antelopes (*Alcelaphus tora*). Purchased.
2 Sœmmering's Antelopes (*Gazella sœmmeringi*). Deposited.
1 Horned Lizard (*Phrynosoma cornutum*). Presented by Mr. A. N. Shillingford.
1 Crested Pigeon (*Ocyphaps lophotes*). Bred in the Gardens.
6. 1 Fieldfare (*Turdus pilaris*). Presented by Mr. F. Lubbock.
2 Redwings (*Turdus iliacus*). Presented by Mr. F. Lubbock.
7. 2 Brown Bears (*Ursus arctos*). Deposited.
1 Weka Rail (*Ocydromus australis*). Presented by Capt. Jessop.
2 Shore-Larks (*Eremophila alpestris*). Presented by Mr. A. Hewitson.
8. 2 Parrot Fruit-pigeons (*Treron viridis*). Deposited.
1 Bronze-spotted Dove (*Chalcopelia chalcospilos*). Presented by E. C. Ionides, Esq., F.Z.S.
1 Vinaceous Turtle Dove (*Turtur vinaceus*). Presented by E. C. Ionides, Esq., F.Z.S.
9. 9 Alpine Newts (*Triton alpestris*). Presented by Mr. P. L. Sclater, F.R.S. From Tyrol.
10. 1 Little Grebe (*Podiceps minor*). Presented by Mr. W. Johnson.
1 Ocelot (*Felis pardalis*). Deposited.
11. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. H. J. Jones.
1 Chacma Baboon (*Cynocephalus porcarius*). Presented by Mr. H. S. Wright.
1 Geoffroy's Dove (*Peristera geoffroii*). Bred in the Gardens.
12. 1 Pig-tailed Monkey (*Macacus nemestrinus*), ♂. Deposited.
13. 2 Indian Cobras (*Naia tripudians*). Presented by Sir Joseph Fayrer, C.S.I., F.Z.S.
14. 1 Tamandua Ant-eater (*Tamandua tridactyla*). Purchased.
2 Snowy Owls (*Nyctea nivea*). Presented by Mr. C. L. W. Gardner.
16. 1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mr. M. Almond.
2 Palm-Squirrels (*Sciurus palmarum*), ♀ ♀. Presented by Mr. H. Grey.
1 Herring-Gull (*Larus argentatus*). Deposited.
1 Pied Wagtail (*Motacilla yarrelli*). Purchased.
18. 1 Greater Spotted Woodpecker (*Picus major*). Presented by Miss Martindale.
1 Common Barn-Owl (*Strix flammea*). Presented by Mr. C. J. Sims.
19. 1 Collared Peccary (*Dicotyles tajacu*). Purchased.
1 Tataupa Tinamou (*Crypturus tataupa*). Purchased.
1 Fuliginous Tanager (*Pitylus fuliginosus*). Purchased.
1 Magpie Tanager (*Cissopis leveriana*). Purchased.
4 Black-crested Cardinals (*Gubernatrix cristatella*). Purchased.
2 Ashy-headed Gulls (*Larus cirrocephalus*). Purchased.
2 De Filippi's Meadow Starlings (*Sturnella defilippii*). Purchased.
21. 1 Grivet Monkey (*Cercopithecus griseoviridis*) ♀. Presented by Mr. T. T. Sich.
1 Green Turtle (*Chelone viridis*). Presented by Master Strover.

Oct. 23. 1 Cape-Hyrax (*Hyrax capensis*). Presented by Mr. J. M. Thornton.
1 Common Hangnest (*Icterus vulgaris*). Presented by Mr. J. T. Levett.
1 Merlin (*Hypotriorchis æsalon*). Purchased.
24. 1 African Cobra (*Naia haje*). Presented by Rev. G. H. R. Fisk.
25. 2 Norwegian Lemmings (*Lemmus norvegicus*). Presented by Mr. W. Duppa Crotch.
26. 1 Vervet Monkey (*Cercopithecus lalandi*). Deposited.
1 Common Crossbill (*Loxia curvirostra*). Presented by Master Geo. Godson.
2 Indian Cobras (*Naia tripudians*). Received in exchage.
28. 1 Ocelot (*Felis pardalis*). Presented by Mr. H. Fielding.
31. 1 Puma (*Felis concolor*). Presented by Miss Brassey. From Santa Fe, Argent. Repub.
1 Sulphur-breasted Toucan (*Ramphastos carinatus*). Purchased. From Cartagena.
1 Duck-Falcon (*Falco anatum*). Purchased. Captured at sea.
2 Black Tortoises (*Testudo carbonaria*). Purchased.
1 Common Boa (*Boa constrictor*). Purchased.
1 Osprey (*Pandion haliaëtus*). Purchased.
1 Sclater's Tanager (*Euphonia sclateri*). Purchased. From Porto Rico.
1 Andean Goose (*Bernicla melanoptera*). Purchased.

Nov. 1. 1 Bonnet-Monkey (*Macacus radiatus*). Deposited.
2 Senegal Touracous (*Corythaix persa*). Deposited.
1 Sun-Bittern (*Eurypyga helias*). Deposited.
1 Scarlet Ibis (*Ibis rubra*). Deposited.
1 Javan Sparrow (*Padda oryzivora*). Presented by Miss S. de Holter.
2. 2 Domestic Swine (*Sus scrofa*), ♂ ♀. Solid-hoofed variety. Presented by Mr. J. A. de Aldama. From Cuba. See P.Z.S. 1877.
3. 1 Persian Gazelle (*Gazella subgutturosa*), ♂. Presented by Mr. T. Fowler.
1 Ringnecked Parrakeet (*Palæornis torquata*). Deposited.
4. 1 Emu (*Dromæus novæ hollandiæ*). Presented by Mr. W. Battersby.
1 St. Helena Seed-eater (*Crithagra butyracea*). Presented by Mr. A. H. Cocks, F.L.S.
6. 2 Esquimaux Dogs (*Canis familiaris*), ♂ ♂. Presented by Capt. Allen Young.
4 Visachas (*Lagostomus trichodactylus*). Presented by Mr. C. F. Woodgate.
7. 1 American Thrush (*Turdus migratorius*). Deposited.
6 Double-spurred Francolins (*Francolinus bicalcaratus*). Deposited.
8. 1 Green Monkey (*Cercopithecus callitrichus*), ♀. Presented by Miss Ridsdan.
4 Redpolls (*Linaria borealis*). Purchased.
9. 1 Raven (*Corvus corax*). Presented by Miss L. Collier.
10. 3 American Red Foxes (*Canis fulvus*). Deposited.
1 Golden Eagle (*Aquila chrysaëtos*). Deposited.
2 Banded Ichneumons (*Herpestes fasciatus*). Presented by Mr. W. N. Bakewell.
3 Chipping Squirrels (*Tamias striatus*). Presented by Mr. F. W. Stockwell.

Nov. 10. 1 Peregrine Falcon (*Falco peregrinus*). Presented by Mr. Chilton Newburn.
11. 1 Long-eared Bat (*Plecotus auritus*). Presented by Miss E. M. Smee.
12. 2 Redwings (*Turdus iliacus*). Purchased.
13. 1 Bubaline Antelope (*Alcelaphus bubalis*), ♂. Purchased.
1 Addax Antelope (*Addax naso-maculatus*), ♀. Purchased.
1 Buff-breasted Partridge (*Ptilopachys ventralis*). Purchased.
1 Hairy-rumped Agouti (*Dasyprocta prymnolopha*). Born in the Gardens.
1 Macacque Monkey (*Macacus cynomolgus*). Deposited.
14. 1 Chilian Sea-Eagle (*Geranoaëtus aguia*). Deposited.
16. 2 Prussian Carp (*Carassius vulgaris*). Presented by Lord Arthur Russell, F.Z.S.
17. 4 Brazilian Cormorants (*Phalacrocorax brasiliensis*). Purchased. See P. Z. S. 1876, p. 676.
20. 1 Indian Leopard (*Felis pardus*), ♂. Deposited.
21. 1 Globose Curassow (*Crax globicera*), ♀. Purchased.
1 Hooded Crane (*Grus monachus*). Purchased. See P. Z. S. 1876, p. 676.
22. 1 Bonnet-Monkey (*Macacus radiatus*). Presented by Mr. E. F. Mathews.
1 Slender-billed Cockatoo (*Licmetis pastinator*). Presented by Mrs. Stevens.
1 Gannet (*Sula bassana*). Presented by Mr. R. H. W. Leach.
1 Shahin Falcon (*Falco peregrinator*). Captured at sea near Aden. Presented by Mr. A. Whyte.
23. 1 Grivet Monkey (*Circopithecus griseo-viridis*), ♂. Deposited.
1 Indian Muntjac (*Cervulus muntjac*), ♀. Born in the Menagerie.
26. 1 Japanese Deer (*Cervus sika*), ♂. Born in the Menagerie.
28. 1 Bonnet Monkey (*Macacus radiatus*), ♀. Presented by Mrs. Aspinall.
1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. R. Schott y Larios.
1 Duyker Bok (*Cephalophus mergens*), ♂. Presented by Mr. J. D. Witherspoon.
1 Spring Bok (*Gazella euchore*), ♀. Purchased.
4 Chiloe Widgeons (*Mareca chiloënsis*), 2 ♂ & 2 ♀. Received in exchange.
29. 3 Rough-legged Buzzards (*Archibuteo lagopus*). Received.
30. 1 White-throated Capuchin (*Cebus hypoleucus*), ♀. Presented by Mr. H. B. Whitmarsh.
1 Hairy-rumped Agouti (*Dasyprocta prymnolopha*). Presented by Mrs. Booth.
1 Long-nosed Crocodile (*Crocodilus cataphractus*). Deposited.

Dec. 2. 1 Rufescent Snake (*Leptodira rufescens*). Presented by Rev. G. H. R. Fisk.
1 Rufous Snake (*Ablabes rufulus*). Presented by Rev. G. H. R. Fisk.
4. 1 Snowy Owl (*Nyctea nivea*). Presented by Mr. John Kendall. From the West of Ireland. See P. Z. S. 1877, p. 1.
5. 1 Patcas Monkey (*Cercopithecus ruber*), ♀. Presented by Mr. J. W. Feather.
1 Brown Capuchin (*Cebus fatuellus*), ♂. Deposited.
6. 1 Chiloe Widgeon (*Mareca chiloënsis*), ♀. Received in exchange.
1 Royal Python (*Python regius*). Deposited.
1 West-African Python (*Python sebæ*). Deposited.

Dec. 7. 1 Kinkajou (*Cercoleptes caudivolvulus*). Deposited.
1 Short-eared Owl (*Otus brachyotus*). Presented by Mr. W. K. Stanley.
8. 2 Crested Guinea Fowls (*Numida cristata*). Presented by Mr. D. R. Ratcliff.
8. 2 King Parrakeets (*Aprosmictus scapulatus*). Presented by Miss E. Rigby.
9. 1 Australian Crane (*Grus australasiana*). Presented by Mr. H. Roberts.
3 Mexican Jays (*Cyanocorax luxuosus*). Purchased. See P. Z. S. 1877, p. 1.
11. 1 Sykes's Monkey (*Cercopithecus albogularis*), ♀. Presented by Mr. R. Payne.
1 Silver-backed Fox (*Canis chama*), ♂. Presented by Mr. R. Ladd.
2 Jardine's Parrots (*Pœocephalus gulielmi*). Purchased.
12. 1 Rhesus Monkey (*Macacus erythræus*), ♂. Presented by Mr. J. H. Ivory.
2 Orange-headed Ground-Thrushes (*Geocichla citrina*). Purchased. See P. Z. S. 1877, p. 2.
2 White-throated Jay-Thrushes (*Garrulax albogularis*). Purchased. See P. Z. S. 1877, p. 2.
1 Horsfield's Whistling Thrush (*Myiophoneus horsfieldi*). Purchased. See P. Z. S. 1877, p. 2.
1 Common Buzzard (*Buteo vulgaris*). Purchased.
13. 1 Black-headed Gull (*Larus ridibundus*). Presented by Mr. J. Smart.
15. 1 Hoffmann's Sloth (*Cholopus hoffmanni*). Presented by Mr. L. R. Dickinson.
16. 1 Vervet Monkey (*Cercopithecus lalandi*), ♀. Presented by Mr. T. Mash.
1 Red Coati (*Nasua nasica*), ♀. Deposited.
1 Common Paradoxure (*Paradoxurus typus*). Presented by Mr. J. B. Wilson.
1 Bungoma Water-Tortoise (*Emyda granosa*). Presented by Mr. J. B. Wilson. From the river Jumna.
18. 1 Dunlin (*Tringa cinclus*). Presented by Mr. F. Cresswell.
20. 1 Chinese Eyebrowed Thrush (*Leucodioptron canorum*). Presented by Mrs. Arabin.
1 Short-eared Owl (*Otus brachyotus*). Presented by Mr. J. Lee.
21. 1 Greater Sulphur-crested Cockatoo (*Cacatua galerita*). Deposited.
1 King Parrakeet (*Aprosmictus scapulatus*). Deposited.
1 Scaly Ground-Dove (*Scardafella squamosa*). Purchased.
22. 1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Mr. Peter Varwell.
1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Mrs. Evans.
1 Redwing (*Turdus iliacus*). Presented by Mrs. A. H. Jamrach.
3 Golden Orioles (*Oriolus galbula*). Presented by Mrs. A. H. Jamrach.
1 Snowy Owl (*Nyctea nivea*). Deposited. From Lancaster Sound.
29. 1 Yellow-lored Amazon (*Chrysotis xantholora*). Purchased.
30. 6 Greek Partridges (*Caccabis saxatilis*). Presented by Commander F. M. Burke. From Persia.
2 Black-headed Partridges (*Caccabis melanocephala*). Presented by Commander F. M. Burke. From Hedyar, near Mecca. See P. Z. S. 1877, p. 2.
1 Hey's Partridge (*Caccabis heyi*). Presented by Commander F. M. Burke. From Hedyar, near Mecca. See P. Z. S. 1877, p. 2.

RAL HISTORY

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